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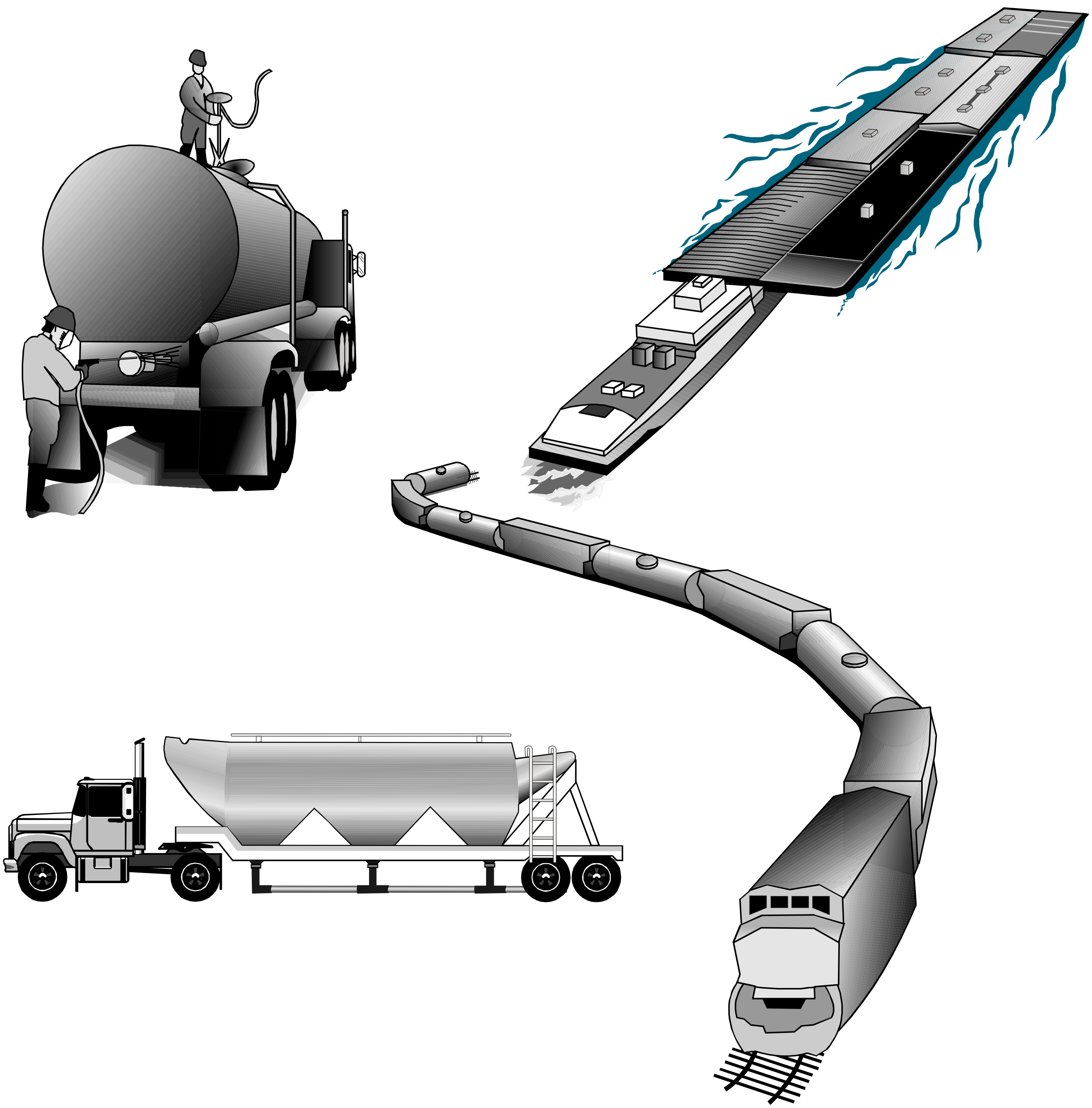
# Development Document For Proposed Effluent Limitations Guidelines And Standards For The Transportation Equipment Cleaning Category



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# 1.0 LEGAL AUTHORITY

Effluent limitations guidelines and standards for the Transportation Equipment Cleaning Industry (TECI) are being proposed under the authority of Sections 301, 304, 306, 307, 308, and 501 of the Clean Water Act, 33 U.S.C. 1311, 1314, 1316, 1317, 1318, and 1361.

## 1.1 Clean Water Act (CWA)

The Federal Water Pollution Control Act Amendments of 1972 established a comprehensive program to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (Section 101(a)). To implement the Act, the United States Environmental Protection Agency (EPA) is to issue effluent limitations guidelines, pretreatment standards, and new source performance standards for industrial dischargers. These guidelines and standards are summarized briefly in the following sections.

### 1.1.1 Best Practicable Control Technology Currently Available (BPT) (Section 304(b)(1) of the CWA)

In the guidelines for an industry category, EPA defines BPT effluent limits for conventional, priority,[1] and nonconventional pollutants. In specifying BPT, EPA looks at a number of factors. EPA first considers the cost of achieving effluent reductions in relation to the effluent reduction benefits. The Agency also considers: the age of the equipment and facilities; the processes employed and any required process changes; engineering aspects of the control technologies; non-water quality environmental impacts (including energy requirements); and such other factors as the Agency deems appropriate (CWA 304(b)(1)(B)). Traditionally, EPA

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[1] In the initial stages of EPA CWA regulation, EPA efforts emphasized the achievement of BPT limitations for control of the "classical" pollutants (e.g., TSS, pH, $BOD_5$). However, nothing on the face of the statute explicitly restricted BPT limitation to such pollutants. Following passage of the Clean Water Act of 1977 with its requirement for points sources to achieve best available technology limitations to control discharges of toxic pollutants, EPA shifted its focus to address the listed priority pollutants under the guidelines program. BPT guidelines continue to include limitations to address all pollutants.

establishes BPT effluent limitations based on the average of the best performances of facilities within the industry of various ages, sizes, processes, or other common characteristics. Where, however, existing performance is uniformly inadequate, EPA may require higher levels of control than currently in place in an industrial category if the Agency determines that the technology can be practically applied.

### 1.1.2 Best Conventional Pollutant Control Technology (BCT) (Section 304(b)(4) of the CWA)

The 1977 amendments to the CWA required EPA to identify effluent reduction levels for conventional pollutants associated with BCT technology for discharges from existing industrial point sources. In addition to other factors specified in Section 304(b)(4)(B), the CWA requires that EPA establish BCT limitations after consideration of a two part "cost-reasonableness" test. EPA explained its methodology for the development of BCT limitations in July 1986 (51 FR 24974).

Section 304(a)(4) designates the following as conventional pollutants: biochemical oxygen demand ($BOD_5$), total suspended solids (TSS), fecal coliform, pH, and any additional pollutants defined by the Administrator as conventional. The Administrator designated oil and grease as an additional conventional pollutant on July 30, 1979 (44 FR 44501).

### 1.1.3 Best Available Technology Economically Achievable (BAT) (Section 304(b)(2) of the CWA)

In general, BAT effluent limitations guidelines represent the best economically achievable performance of plants in the industrial subcategory or category. The factors considered in assessing BAT include the cost of achieving BAT effluent reductions, the age of equipment and facilities involved, the process employed, potential process changes, and non-water quality environmental impacts, including energy requirements. The Agency retains considerable discretion in assigning the weight to be accorded these factors. BAT limitations may be based on effluent reductions attainable through changes in a facility's processes and operations. As with BPT, where existing performance is uniformly inadequate, BAT may require a higher level of performance than is currently being achieved based on technology transferred from a different subcategory or category. BAT may be based upon process changes or internal controls, even when these technologies are not common industry practice.

### 1.1.4 New Source Performance Standards (NSPS) (Section 306 of the CWA)

NSPS reflect effluent reductions that are achievable based on the best available demonstrated control technology. New facilities have the opportunity to install the best and most efficient production processes and wastewater treatment technologies. As a result, NSPS should represent the most stringent controls attainable through the application of the best available control technology for all pollutants (i.e., conventional, nonconventional, and priority pollutants). In establishing NSPS, EPA is directed to take into consideration the cost of achieving the effluent reduction and any non-water quality environmental impacts and energy requirements.

### 1.1.5 Pretreatment Standards for Existing Sources (PSES) (Section 307(b) of the CWA)

PSES are designed to prevent the discharge of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of publicly-owned treatment works (POTWs). The CWA authorizes EPA to establish pretreatment standards for pollutants that pass through POTWs or interfere with treatment processes or sludge disposal methods at POTWs. Pretreatment standards are technology-based and analogous to BAT effluent limitations guidelines.

The General Pretreatment Regulations, which set forth the framework for the implementation of categorical pretreatment standards, are found at 40 CFR Part 403. Those regulations contain a definition of pass-through that addresses localized rather than national instances of pass-through and establish pretreatment standards that apply to all nondomestic dischargers (see 52 FR 1586, January 14, 1987).

### 1.1.6 Pretreatment Standards for New Sources (PSNS) (Section 307(b) of the CWA)

Like PSES, PSNS are designed to prevent the discharges of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTWs. PSNS are to be issued at the same time as NSPS. New indirect dischargers have the opportunity to incorporate into their plants the best available demonstrated technologies. The Agency considers the same factors in promulgating PSNS as it considers in promulgating NSPS.

## 1.2 Section 304(m) Requirements

Section 304(m) of the CWA, added by the Water Quality Act of 1987, requires EPA to establish schedules for (1) reviewing and revising existing effluent limitations guidelines and standards ("effluent guidelines") and (2) promulgating new effluent guidelines. On January 2, 1990, EPA published an Effluent Guidelines Plan (55 FR 80) that established schedules for developing new and revised effluent guidelines for several industry categories. One of the industries for which the Agency established a schedule was the TECI.

In 1992, EPA entered into a Consent Decree requiring proposal and final agency action of effluent limitations guidelines and standards final rule for the TECI (NRDC vs. Browner D.D.C. 89-2980). In December of 1997, the Plaintiffs and EPA agreed to modify the deadlines for proposal to May 15, 1998 and a deadline of June 15, 2000 for final action.

## 1.3 Pollution Prevention Act

In the Pollution Prevention Act (PPA) of 1990 (42 U.S.C. 13101 et seq., Pub. Law 101-508, November 5, 1990), Congress declared pollution prevention a national policy of the United States. The PPA declares that pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner whenever feasible; pollution that cannot be prevented or recycled should be treated; and disposal or other release into the environment should be chosen only as a last resort and should be conducted in an environmentally safe manner. The PPA directs EPA to, among other things, "review regulations of the Agency prior and subsequent to their proposal to determine their effect on source reduction" (Sec. 6604; 42 U.S.C. 13103(b)(2)). This proposed regulation for the TECI was reviewed for its incorporation of pollution prevention as part of the Agency effort. Pollution prevention practices applicable to the TECI are described in Section 8.1.

# 2.0 SUMMARY AND SCOPE

The proposed regulations for the Transportation Equipment Cleaning Industry (TECI) include effluent limitations guidelines and standards for the control of pollutants in wastewater. This document presents the information and rationale supporting the proposed effluent limitations guidelines and standards. Section 2.0 highlights the applicability, subcategorization, and technology bases of the proposed rule.

## 2.1 Applicability of the Proposed Regulation

Transportation equipment cleaning (TEC) facilities are defined as those facilities that generate wastewater from cleaning the interior of tank trucks, closed-top hopper trucks, rail tank cars, closed-top hopper rail cars, intermodal tank containers, inland tank barges, closed-top hopper barges, ocean/sea tankers, and other similar tanks (excluding drums and intermediate bulk containers) used to transport materials or cargos that come into direct contact with the tank or container interior. Facilities which do not engage in cleaning the interior of tanks are not considered within the scope of this proposal.

The focus of this proposed rule is on transportation equipment cleaning facilities that function independently of other industrial activities that generate wastewater. This proposal would therefore not apply to wastewater discharges from transportation equipment cleaning operations located at industrial facilities regulated under other Clean Water Act (CWA) effluent guidelines, provided that the facility cleans only tanks containing cargos or commodities generated or used on site, or by a facility under the same corporate structure.

The wastewater flows covered by the proposed rule include all washwaters which have come into direct contact with the tank or container interior including prerinse cleaning solutions, chemical cleaning solutions, and final rinse solutions. Additionally, the rule would cover wastewater generated from washing vehicle exteriors, and equipment and floor washings for those facilities covered by the proposed guidelines.

EPA has identified an estimated population of 1,239 TEC facilities that are not already covered by other CWA effluent guidelines. EPA estimates that 341 facilities will be affected by the proposal.

## 2.2 Subcategorization

EPA is proposing to subcategorize the TEC point source category into 11 subcategories based on types of cargos carried and transportation mode. The subcategories are listed below and are described in Table 2-1 at the end of this section.

- Subcategory A: Truck/Chemical;
- Subcategory B: Rail/Chemical;
- Subcategory C: Barge/Chemical & Petroleum;
- Subcategory D: Truck/Food;
- Subcategory E: Rail/Food;
- Subcategory F: Barge/Food;
- Subcategory G: Truck/Petroleum;
- Subcategory H: Rail/Petroleum;
- Subcategory I: Truck/Hopper;
- Subcategory J: Rail/Hopper; and
- Subcategory K: Barge/Hopper.

## 2.3 Summary of Proposed Rule

The components of the proposed rules applicable to each subcategory of the TECI are shown in Table 2-2 and are described in the following subsections.

### 2.3.1 Best Practicable Control Technology Currently Available (BPT)

EPA is proposing BPT for the three chemical subcategories of the TECI to control priority, nonconventional, and conventional pollutants in wastewater from direct dischargers. EPA is also proposing BPT for the three food grade subcategories of the TECI to control conventional pollutants in wastewater from direct dischargers. The specific pollutants controlled vary for each subcategory. Table 2-3 summarizes the technology basis for BPT for each regulated subcategory. Tables 2-4 through 2-9 present the proposed effluent limitations guidelines for each regulated subcategory.

### 2.3.2 Best Conventional Pollutant Control Technology (BCT)

EPA is proposing BCT equivalent to BPT for the three chemical and three food grade subcategories of the TECI to control conventional pollutants in wastewater from direct dischargers. Table 2-3 summarizes the technology basis for BCT for each regulated subcategory. Tables 2-4 through 2-9 present the proposed effluent limitations guidelines for each regulated subcategory.

### 2.3.3 Best Available Technology Economically Achievable (BAT)

EPA is proposing BAT equivalent to BPT for the three chemical subcategories of the TECI to control priority and nonconventional pollutants in wastewater from direct dischargers. EPA is not proposing BAT for the food subcategories because EPA is not proposing to regulate any priority pollutants in these subcategories. The specific pollutants controlled vary for each subcategory. Table 2-3 summarizes the technology basis for BAT for each regulated subcategory. Tables 2-4 through 2-6 present the proposed effluent limitations guidelines for each regulated subcategory.

### 2.3.4 New Source Performance Standards (NSPS)

EPA is proposing NSPS for the three chemical subcategories of the TECI to control priority, nonconventional, and conventional pollutants in wastewater from new direct dischargers. EPA is also proposing NSPS for the three food grade subcategories of the TECI to control conventional pollutants in wastewater from new direct dischargers. The specific pollutants controlled vary for each subcategory. Table 2-3 summarizes the technology basis for

NSPS for each regulated subcategory. Tables 2-4 through 2-9 present the proposed effluent limitations guidelines for each regulated subcategory.

### 2.3.5 Pretreatment Standards for Existing Sources (PSES)

EPA is proposing PSES for two chemical subcategories of the TECI to control priority and nonconventional pollutants in wastewater from indirect dischargers. The specific pollutants controlled vary for each subcategory. Table 2-10 summarizes the technology basis for PSES for each regulated subcategory. Tables 2-11 through 2-13 present the proposed pretreatment standards for each regulated subcategory for discharges to publicly-owned treatment works (POTWs).

### 2.3.6 Pretreatment Standards for New Sources (PSNS)

EPA is proposing PSNS for the three chemical subcategories of the TECI to control priority and nonconventional pollutants in wastewater from new indirect dischargers. The specific pollutants controlled vary for each subcategory. Table 2-10 summarizes the technology basis for PSNS for each regulated subcategory. Tables 2-11 through 2-13 present the proposed pretreatment standards for each regulated subcategory for discharges to POTWs.

# Table 2-1

## Proposed Subcategorization for the Transportation Equipment Cleaning Industry

| Proposed Subcategory | | Subcategory Description |
|---|---|---|
| A | Truck/Chemical | TEC facilities that clean tank trucks and intermodal tank containers where 10% or more of the total tanks cleaned at that facility in an average year contained chemical cargos. |
| B | Rail/Chemical | TEC facilities that clean rail tank cars where 10% or more of the total tanks cleaned at that facility in an average year contained chemical cargos. |
| C | Barge/Chemical & Petroleum | TEC facilities that clean tank barges or ocean/sea tankers where 10% or more of the total tanks cleaned at that facility in an average year contained chemical and/or petroleum cargos. |
| D | Truck/Food | TEC facilities that clean tank trucks and intermodal tank containers where 10% or more of the total tanks cleaned at that facility in an average year contained food grade cargos, so long as that facility does not clean 10% or more of tanks containing chemical cargos. If 10% or more of the total tanks cleaned at that facility in an average year contained chemical cargos, then that facility is in Subcategory A: Truck/Chemical. |
| E | Rail/Food | TEC facilities that clean rail tank cars where 10% or more of the total tanks cleaned at that facility in an average year contained food grade cargos, so long as that facility does not clean 10% or more of tanks containing chemical cargos. If 10% or more of the total tanks cleaned at that facility in an average year contained chemical cargos, then that facility is in Subcategory B: Rail/Chemical. |
| F | Barge/Food | TEC facilities that clean tank barges or ocean/sea tankers where 10% or more of the total tanks cleaned at that facility in an average year contained food grade cargos, so long as that facility does not clean 10% or more of tanks containing chemical cargos. If 10% or more of the total tanks cleaned at that facility in an average year contained chemical and/or petroleum cargos, then that facility is in Subcategory C: Barge/Chemical & Petroleum. |
| G | Truck/Petroleum | TEC facilities that clean tank trucks and intermodal tank containers where 80% or more of the total tanks cleaned at that facility in an average year contained petroleum cargos, so long as that facility is not in Subcategory A: Truck/Chemical or Subcategory D: Truck/Food. |
| H | Rail/Petroleum | TEC facilities that clean rail tank cars where 80% or more of the total tanks cleaned at that facility in an average year contained petroleum cargos, so long as that facility is not in Subcategory B: Rail/Chemical or Subcategory E: Rail/Food. |
| I | Truck/Hopper | TEC facilities that clean closed-top hopper trucks which transport dry bulk commodities that are not chemical commodities. |
| J | Rail/Hopper | TEC facilities that clean closed-top hopper rail cars which transport dry bulk commodities that are not chemical commodities. |
| K | Barge/Hopper | TEC facilities that clean closed-top hopper barges which transport dry bulk commodities that are not chemical commodities. |

# Table 2-2

## Summary of Proposed Rules for the Transportation Equipment Cleaning Industry Point Source Category

| Subpart Subcategory | | PSES | BPT | BAT | BCT | PSNS | NSPS |
|---|---|---|---|---|---|---|---|
| A | Truck/Chemical | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| B | Rail/Chemical | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| C | Barge/Chemical & Petroleum | | ✔ | ✔ | ✔ | ✔ | ✔ |
| D | Truck/Food | | ✔ | | ✔ | | ✔ |
| E | Rail/Food | | ✔ | | ✔ | | ✔ |
| F | Barge/Food | | ✔ | | ✔ | | ✔ |
| G | Truck/Petroleum | No regulations | | | | | |
| H | Rail/Petroleum | | | | | | |
| I | Truck/Hopper | No regulations | | | | | |
| J | Rail/Hopper | | | | | | |
| K | Barge/Hopper | | | | | | |

# Table 2-3

## Summary of Technology Basis for BPT, BCT, BAT, and NSPS

| Proposed Subcategory | | Technology Basis | |
|---|---|---|---|
| A | Truck/Chemical | BPT<br>BCT<br>BAT<br>NSPS | Flow reduction; Equalization; Oil/water separation; Turn-key treatment system including chemical oxidation, neutralization, coagulation, and clarification; Biological treatment; Carbon adsorption; and Sludge dewatering. |
| B | Rail/Chemical | BPT<br>BCT<br>BAT | Flow reduction; Oil/water separation; Biological treatment; and Sludge dewatering. |
| B | Rail/Chemical | NSPS | Flow reduction; Equalization, Dissolved Air Flotation; Biological treatment; Organo-clay/activated carbon filtration; and Sludge dewatering. |
| C | Barge/Chemical & Petroleum | BPT<br>BCT<br>BAT<br>NSPS | Flow reduction; Oil/water separation; Dissolved air flotation; Filter press (in-line wastewater treatment); Biological treatment; and Sludge dewatering. |
| D | Truck/Food | BPT<br>BCT<br>NSPS | Flow reduction; Oil/water separation; Biological treatment; and Sludge dewatering. |
| E | Rail/Food | BPT<br>BCT<br>NSPS | Flow reduction; Oil/water separation; Biological treatment; and Sludge dewatering. |
| F | Barge/Food | BPT<br>BCT<br>NSPS | Flow reduction; Oil/water separation; Biological treatment; and Sludge dewatering. |

# Table 2-4

## Truck/Chemical Subcategory: BPT, BCT, BAT, and NSPS Proposed Mass Based Limitations for Discharges to Surface Waters

| Pollutant or Pollutant Property | [Grams/Tank] | | | | | | |
|---|---|---|---|---|---|---|---|
| | BPT | | BCT | | BAT | NSPS | |
| | Daily Maximum | Monthly Average | Daily Maximum | Monthly Average | Daily Maximum/ Monthly Average | Daily Maximum | Monthly Average |
| $BOD_5$ (a) | 145 | 67.6 | 145 | 67.6 | NA | 145 | 67.6 |
| TSS (b) | 281 | 115 | 281 | 115 | NA | 281 | 115 |
| Oil and Grease (HEM) (c) | 25.3 | 16.1 | 25.3 | 16.1 | NA | 25.3 | 16.1 |
| Chromium | 0.16 | 0.16 | NA | NA | 0.16 | 0.16 | 0.16 |
| Zinc | 0.09 | 0.09 | NA | NA | 0.09 | 0.09 | 0.09 |
| COD (d) | 3760 | 3760 | NA | NA | 3760 | 3760 | 3760 |
| Bis (2-ethylhexyl) Phthalate | 0.12 | 0.12 | NA | NA | 0.12 | 0.12 | 0.12 |
| Di-n-Octyl Phthalate | 0.12 | 0.12 | NA | NA | 0.12 | 0.12 | 0.12 |
| n-Dodecane | 0.12 | 0.12 | NA | NA | 0.12 | 0.12 | 0.12 |
| n-Hexadecane | 0.12 | 0.12 | NA | NA | 0.12 | 0.12 | 0.12 |
| Styrene | 0.20 | 0.20 | NA | NA | 0.20 | 0.20 | 0.20 |
| 1,2-Dichlorobenzene | 0.12 | 0.12 | NA | NA | 0.12 | 0.12 | 0.12 |

(a) $BOD_5$ - Biochemical oxygen demand (5-day).
(b) TSS - Total suspended solids.
(c) HEM - Hexane extractable material.
(d) COD - Chemical oxygen demand.
NA - Not applicable.

# Table 2-5

## Rail/Chemical Subcategory: BPT, BCT, BAT, and NSPS Proposed Mass Based Limitations for Discharges to Surface Waters

| Pollutant or Pollutant Property | [Grams/Tank] | | | | | | |
|---|---|---|---|---|---|---|---|
| | BPT | | BCT | | BAT | NSPS | |
| | Daily Maximum | Monthly Average | Daily Maximum | Monthly Average | Daily Maximum/ Monthly Average | Daily Maximum | Monthly Average |
| $BOD_5$ (a) | 3,840 | 1,790 | 3,840 | 1,790 | NA | 3,840 | 1,790 |
| TSS (b) | 338 | 141 | 338 | 141 | NA | 338 | 141 |
| Oil and Grease (HEM) (c) | 470 | 286 | 470 | 286 | NA | 130 | 83 |
| COD (d) | 42,200 | 42,200 | NA | NA | 42,200 | 42,200 | 42,200 |
| n-Dodecane | 0.63 | 0.63 | NA | NA | 0.63 | 0.43 | 0.43 |
| n-Hexadecane | 0.43 | 0.43 | NA | NA | 0.43 | 0.43 | 0.43 |
| n-Tetradecane | 0.43 | 0.43 | NA | NA | 0.43 | 0.43 | 0.43 |
| Anthracene | 2.20 | 2.20 | NA | NA | 2.20 | 2.20 | 2.20 |
| Pyrene | 0.68 | 0.68 | NA | NA | 0.68 | 0.68 | 0.68 |
| Fluoranthene | 0.74 | 0.74 | NA | NA | 0.74 | 0.74 | 0.74 |
| Phenanthrene | 1.96 | 1.96 | NA | NA | 1.96 | 1.96 | 1.96 |

(a) $BOD_5$ - Biochemical oxygen demand (5-day).
(b) TSS - Total suspended solids.
(c) HEM - Hexane extractable material.
(d) COD - Chemical oxygen demand.
NA - Not applicable.

# Table 2-6

## Barge/Chemical & Petroleum Subcategory: BPT, BCT, BAT, and NSPS Proposed Mass Based Limitations for Discharges to Surface Waters

| | [Grams/Tank] | | | | | | |
|---|---|---|---|---|---|---|---|
| | BPT | | BCT | | BAT | NSPS | |
| Pollutant or Pollutant Property | Daily Maximum | Monthly Average | Daily Maximum | Monthly Average | Daily Maximum/ Monthly Average | Daily Maximum | Monthly Average |
| $BOD_5$ (a) | 18,300 | 8,600 | 18,300 | 8,600 | NA | 18,300 | 8,600 |
| TSS (b) | 9,540 | 6,090 | 9,540 | 6,090 | NA | 9,540 | 6,090 |
| Oil and Grease (HEM) (c) | 658 | 294 | 658 | 294 | NA | 658 | 294 |
| COD (d) | 74,300 | 74,300 | NA | NA | 74,300 | 74,300 | 74,300 |
| Cadmium | 0.19 | 0.19 | NA | NA | 0.19 | 0.19 | 0.19 |
| Chromium | 1.82 | 1.82 | NA | NA | 1.82 | 1.82 | 1.82 |
| Copper | 2.17 | 2.17 | NA | NA | 2.17 | 2.17 | 2.17 |
| Lead | 1.93 | 1.93 | NA | NA | 1.93 | 1.93 | 1.93 |
| Nickel | 15.3 | 15.3 | NA | NA | 15.3 | 15.3 | 15.3 |
| Zinc | 153 | 153 | NA | NA | 153 | 153 | 153 |
| 1-Methylphenanthrene | 2.04 | 2.04 | NA | NA | 2.04 | 2.04 | 2.04 |
| Bis (2-ethylhexyl) Phthalate | 1.88 | 1.88 | NA | NA | 1.88 | 1.88 | 1.88 |
| Di-n-Octyl Phthalate | 2.68 | 2.68 | NA | NA | 2.68 | 2.68 | 2.68 |
| n-Decane | 5.96 | 5.96 | NA | NA | 5.96 | 5.96 | 5.96 |
| n-Docosane | 3.02 | 3.02 | NA | NA | 3.02 | 3.02 | 3.02 |
| n-Dodecane | 16.7 | 16.7 | NA | NA | 16.7 | 16.7 | 16.7 |
| n-Eicosane | 6.67 | 6.67 | NA | NA | 6.67 | 6.67 | 6.67 |
| n-Octadecane | 7.45 | 7.45 | NA | NA | 7.45 | 7.45 | 7.45 |
| n-Tetracosane | 2.19 | 2.19 | NA | NA | 2.19 | 2.19 | 2.19 |
| n-Tetradecane | 7.30 | 7.30 | NA | NA | 7.30 | 7.30 | 7.30 |
| p-Cymene | 0.29 | 0.29 | NA | NA | 0.29 | 0.29 | 0.29 |
| Pyrene | 1.20 | 1.20 | NA | NA | 1.20 | 1.20 | 1.20 |

(a) $BOD_5$ - Biochemical oxygen demand (5-day).
(b) TSS - Total suspended solids.
(c) HEM - Hexane extractable material.
(d) COD - Chemical oxygen demand.
NA - Not applicable.

# Table 2-7

## Truck/Food Subcategory: BPT, BCT, and NSPS Proposed Mass Based Limitations for Discharges to Surface Waters

| Pollutant or Pollutant Property | [Grams/Tank] | | | | | | |
|---|---|---|---|---|---|---|---|
| | BPT | | BCT | | BAT | NSPS | |
| | Daily Maximum | Monthly Average | Daily Maximum | Monthly Average | Daily Maximum/ Monthly Average | Daily Maximum | Monthly Average |
| $BOD_5$ (a) | 166 | 72.4 | 166 | 72.4 | NA | 166 | 72.4 |
| TSS (b) | 673 | 256 | 673 | 256 | NA | 673 | 256 |
| Oil and Grease (HEM) (c) | 60.4 | 26.3 | 60.4 | 26.3 | NA | 60.4 | 26.3 |

(a) $BOD_5$ - Biochemical oxygen demand (5-day).
(b) TSS - Total suspended solids.
(c) HEM - Hexane extractable material.
NA - Not applicable.

# Table 2-8

## Rail/Food Subcategory: BPT, BCT, and NSPS Proposed Mass Based Limitations for Discharges to Surface Waters

| Pollutant or Pollutant Property | [Grams/Tank] | | | | | | |
|---|---|---|---|---|---|---|---|
| | BPT | | BCT | | BAT | NSPS | |
| | Daily Maximum | Monthly Average | Daily Maximum | Monthly Average | Daily Maximum/ Monthly Average | Daily Maximum | Monthly Average |
| $BOD_5$ (a) | 945 | 412 | 945 | 412 | NA | 945 | 412 |
| TSS (b) | 3,830 | 1,460 | 3,830 | 1,460 | NA | 3,830 | 1,460 |
| Oil and Grease (HEM) (c) | 344 | 150 | 344 | 150 | NA | 344 | 150 |

(a) $BOD_5$ - Biochemical oxygen demand (5-day).
(b) TSS - Total suspended solids.
(c) HEM - Hexane extractable material.
NA - Not applicable.

# Table 2-9

## Barge/Food Subcategory: BPT, BCT, and NSPS Proposed Mass Based Limitations for Discharges to Surface Waters

| Pollutant or Pollutant Property | [Grams/Tank] | | | | | | |
|---|---|---|---|---|---|---|---|
| | BPT | | BCT | | BAT | NSPS | |
| | Daily Maximum | Monthly Average | Daily Maximum | Monthly Average | Daily Maximum/ Monthly Average | Daily Maximum | Monthly Average |
| $BOD_5$ (a) | 945 | 412 | 945 | 412 | NA | 945 | 412 |
| TSS (b) | 3,830 | 1,460 | 3,830 | 1,460 | NA | 3,830 | 1,460 |
| Oil and Grease (HEM) (c) | 344 | 150 | 344 | 150 | NA | 344 | 150 |

(a) $BOD_5$ - Biochemical oxygen demand (5-day).
(b) TSS - Total suspended solids.
(c) HEM - Hexane extractable material.
NA - Not applicable.

# Table 2-10

## Summary of Technology Basis for PSES and PSNS

| Proposed Subcategory | | Technology Basis | |
|---|---|---|---|
| A | Truck/Chemical | PSES & PSNS | Flow reduction; Equalization; Oil/water separation; Turn-key treatment system including chemical oxidation, neutralization, coagulation, and clarification; Carbon adsorption; and Sludge dewatering. |
| B | Rail/Chemical | PSES | Flow reduction; and Oil/water separation. |
| B | Rail/Chemical | PSNS | Flow reduction; Oil/water separation; Equalization; Dissolved air flotation; Organo-clay/activated carbon filtration; and Sludge dewatering. |
| C | Barge/Chemical & Petroleum | PSNS | Flow reduction; Oil/water separation; Dissolved air flotation; Filter press (in-line wastewater treatment); Biological treatment; and Sludge dewatering. |

# Table 2-11

## Truck/Chemical Subcategory: PSES and PSNS Proposed Mass Based Limitations for Discharges to POTWs

| Pollutant or Pollutant Property | [Grams/Tank] | | | |
|---|---|---|---|---|
| | PSES | | PSNS | |
| | Daily Maximum | Monthly Average | Daily Maximum | Monthly Average |
| Chromium | 0.20 | 0.20 | 0.20 | 0.20 |
| Zinc | 0.12 | 0.12 | 0.12 | 0.12 |
| COD (a) | 3760 | 3760 | 3760 | 3760 |
| Bis (2-ethylhexyl) Phthalate | 0.23 | 0.23 | 0.23 | 0.23 |
| Di-n-Octyl Phthalate | 0.15 | 0.15 | 0.15 | 0.15 |
| n-Dodecane | 0.19 | 0.19 | 0.19 | 0.19 |
| n-Hexadecane | 0.19 | 0.19 | 0.19 | 0.19 |
| Styrene | 0.40 | 0.40 | 0.40 | 0.40 |
| 1,2-Dichlorobenzene | 0.15 | 0.15 | 0.15 | 0.15 |

(a) COD - Chemical oxygen demand.

# Table 2-12

## Rail/Chemical Subcategory: PSES and PSNS Proposed Mass Based Limitations for Discharges to POTWs

| Pollutant or Pollutant Property | [Grams/Tank] | | | |
|---|---|---|---|---|
| | PSES | | PSNS | |
| | Daily Maximum | Monthly Average | Daily Maximum | Monthly Average |
| Total Petroleum Hydrocarbons (SGT-HEM) (a) | 942 | 942 | 207 | 207 |
| COD (b) | 42,200 | 42,200 | 42,200 | 42,200 |
| n-Hexadecane | 2.56 | 2.56 | 2.56 | 2.56 |
| n-Tetradecane | 3.98 | 3.98 | 0.66 | 0.66 |
| Fluoranthene | 0.60 | 0.60 | 0.60 | 0.60 |

(a) SGT-HEM - Silica-gel treated hexane extractable material.
(b) COD - Chemical oxygen demand.

# Table 2-13

## Barge/Chemical & Petroleum Subcategory: PSES and PSNS Proposed Mass Based Limitations for Discharges to POTWs

| Pollutant or Pollutant Property | [Grams/Tank] | | | |
|---|---|---|---|---|
| | PSES | | PSNS | |
| | Daily Maximum | Monthly Average | Daily Maximum | Monthly Average |
| Total Petroleum Hydrocarbons (SGT-HEM) (a) | NA | NA | 347 | 347 |
| COD (b) | NA | NA | 74,300 | 74,300 |
| Cadmium | NA | NA | 0.51 | 0.51 |
| Chromium | NA | NA | 0.61 | 0.61 |
| Copper | NA | NA | 79.9 | 79.9 |
| Lead | NA | NA | 5.04 | 5.04 |
| Nickel | NA | NA | 39.1 | 39.1 |
| Zinc | NA | NA | 241 | 241 |
| 1-Methylphenanthrene | NA | NA | 9.70 | 9.70 |
| Bis (2-ethylhexyl) Phthalate | NA | NA | 2.05 | 2.05 |
| Di-n-Octyl Phthalate | NA | NA | 7.69 | 7.69 |
| n-Decane | NA | NA | 7.26 | 7.26 |
| n-Docosane | NA | NA | 3.67 | 3.67 |
| n-Dodecane | NA | NA | 20.3 | 20.3 |
| n-Eicosane | NA | NA | 8.13 | 8.13 |
| n-Octadecane | NA | NA | 9.07 | 9.07 |
| n-Tetracosane | NA | NA | 5.51 | 5.51 |
| n-Tetradecane | NA | NA | 8.90 | 8.90 |
| p-Cymene | NA | NA | 2.21 | 2.21 |
| Pyrene | NA | NA | 2.94 | 2.94 |

(a) SGT-HEM - Silica-gel treated hexane extractable material.
(b) COD - Chemical oxygen demand.
NA - Not applicable.

# 3.0 DATA COLLECTION ACTIVITIES

EPA collected data from a variety of sources including existing data from previous EPA and other governmental data collection efforts, industry provided information, data collected from questionnaire surveys, and field sampling data. Each of these data sources is discussed below, as well as the quality assurance/quality control (QA/QC) and other data editing procedures. Summaries and analyses of the data collected by EPA are presented in Sections 4.0 through 12.0.

## 3.1 Summary of TECI Information Collected Prior to 1992

Prior to 1992, EPA conducted two studies of the TECI. The first study was performed during the 1973-74 period for the Transportation Industry Point Source Category. This broad study of the transportation industry was not specific to TEC processes and wastewaters and did not result in any regulations for the TECI. Information from the first study was obtained from only a few TEC facilities and was limited to conventional pollutants. Because of the age of this study, EPA did not use any data from this study in the development of the proposed rule.

In 1989, EPA published the Preliminary Data Summary for the Transportation Equipment Cleaning Industry (1). This second study was performed in response to the Domestic Sewage Study, which identified TEC facilities as potentially discharging high levels of conventional, toxic, and nonconventional pollutants in raw and treated wastewaters. The study was a preliminary investigation to determine the size of the TECI and to estimate the total discharge of priority pollutants. EPA used this data to perform an environmental impact analysis which formed the basis for EPA's decision to develop effluent guidelines specifically for the TECI.

For the second study, the Agency sampled eight TEC facilities between 1986-87, including one aircraft, three tank truck, two rail tank car, and two tank barge cleaning facilities.

Raw TEC wastewater, treated effluent, and sludge were collected and analyzed at each facility. The samples were analyzed for analytes on the 1987 Industrial Technology Division List of Analytes. This list contains conventional pollutants, EPA's priority pollutants (excluding fecal coliform bacteria and asbestos), and 285 additional organic and inorganic nonconventional pollutants or pollutant characteristics.

## 3.2 Summary of the TECI Questionnaires

A major source of information and data used in developing effluent limitations guidelines and standards was industry responses to technical and economic questionnaires distributed by EPA under the authority of Section 308 of the Clean Water Act. These questionnaires requested information concerning tank cleaning operations and wastewater generation, treatment and discharge, as well as wastewater characterization data. Questionnaires also requested financial and economic information for use in assessing economic impacts and the economic achievability of technology options.

### 3.2.1 Identification of Potential TECI Population

In order to characterize the TECI, EPA first developed a potential list of TEC facilities by identifying all potential segments within the industry. EPA characterized the TECI into industry segments based on tank type cleaned (truck, rail, barge, etc.) and business operational structure (independents, carriers, shippers, and builder/leasers) as described in Section 4.0. Since transportation facilities may clean a variety of tank types and may perform a variety of business operations, TEC facilities may have been classified under more than one of these tank type and operational structure segments.

The Agency was unaware of any single source or set of sources that specifically identify facilities that perform TEC operations. Likewise, there is no single Standard Industrial Classification (SIC) code or set of SIC codes that specifically identify facilities that perform TEC operations. Therefore, a variety of sources were identified and evaluated including transportation industry directories, Dun and Bradstreet's Information Services, several Agency databases, trade journals, trade associations, and contacts with state and local authorities.

The Agency performed an exhaustive search to identify all available sources listing facilities that potentially perform TEC operations. In addition to obtaining lists of facilities known to be performing TEC activities, data sources were also used to identify potential TEC facilities by one or more of the following criteria: (1) they own, operate, or maintain transportation equipment (tank trucks, rail tank cars, tank barges); (2) they own, operate, or maintain equipment used by the transportation segments applicable to the TECI (truck haulage, rail transportation, and water transportation); or (3) they report under an SIC code that includes facilities that have the potential to own, operate, or maintain transportation equipment (e.g., local liquid haulage, marine cargo handling, loading or unloading vessels). Table 3-1 lists the major sources identified by EPA by tank type and business operational structure.

The list of facilities obtained from different sources varied in terms of the probability that the facilities on the list actually performed TEC operations. For example, EPA considered facilities identified through trade association lists or telephone contacts to have a high probability of performing TEC operations, while facilities identified through the various SIC codes had a lower likelihood of actually performing TEC operations. In order to account for the variation in the quality of data sources, each facility in the TECI site identification database was assigned a level of assurance representing the probability that the facility performs TEC operations.

Facilities were assigned level of assurances of either high, medium, or low based upon the Agency's evaluation of information provided by each facility source, including information provided by industry and trade association representatives, research of industrial practices, and information obtained during telephone conversations. In general, a high level of assurance indicated that a facility was specifically identified as performing TEC operations. Facilities assigned a medium level of assurance were identified as either owning, operating, or maintaining transportation equipment or performing cleaning of transportation equipment (not specifically tanks) in the transportation segments applicable to the TECI (e.g., SIC Codes 4789-0402 Railroad Car Repair and 4789-0401 Cleaning Railroad Trailers). A low level of assurance was assigned to facilities identified as owning, operating, or maintaining equipment related to the transportation industry with no indication of whether cleaning operations are performed (e.g., SIC Code 4491-0101 Marine Cargo Handling, Loading Vessels). Table 3-2 includes a complete list of sources and source level of assurance used to identify potential TEC facilities.

EPA identified a total potential industry population of 30,280 facilities by compiling the lists from all sources. EPA then constructed a database, called the TECI site identification database, of 7,940 facilities that potentially clean tank interiors. For some data sources, only a portion (i.e., a statistical sample) of the total available records were entered into the database. Therefore, the 7,940 facilities contained in TECI site identification database represents a total potential industry population of 30,280 facilities. For each potential TEC facility identified, the following data were entered into the database: facility type (e.g., truck, rail), facility name, facility address, facility telephone numbers, primary and secondary facility contacts, source(s) of facility information, and level of assurance.

Since multiple sources were used to identify the TEC population, duplicate searches were performed on the database to ensure that there were no duplicate records in the TECI site identification database. This database served as the initial population for EPA to collect industry provided data.

During identification of the potential TECI population and development of the Screener Questionnaire sample frame (see Section 3.2.2.1), the Agency included facilities that clean the exteriors of aircraft and facilities that deice/anti-ice aircraft and/or pavement in the scope of the TECI. As such, the Agency endeavored to identify the population of facilities that perform these operations and entered information for these facilities into the TECI site identification database. The TECI site identification database includes information for an additional 3,960 facilities that potentially clean the exteriors of aircraft or deice/anti-ice aircraft and/or pavement. These 3,960 facilities represent a total potential industry population of 4,781 facilities.

However, the Agency has decided to postpone consideration of developing effluent limitations guidelines and standards for this segment. Therefore, references to the aircraft segment in this section are limited to those required to accurately describe the statistical sampling performed to develop the TECI Screener Questionnaire mailing list (see Section 3.2.2.3).

### 3.2.2 1993 Screener Questionnaire for the Transportation Equipment Cleaning Industry (Screener Questionnaire)

The objectives of the Screener Questionnaire were to:

- Identify facilities that perform TEC operations;
- Evaluate TEC facilities based on wastewater, economic, and/or operational characteristics;
- Develop technical and economic profiles of the TECI;
- Select a statistical sample of screener respondents to receive a Detailed Questionnaire (see Section 3.2.3) such that the sample responses may be used to characterize the TECI; and
- Select facilities for EPA's TECI engineering site visit and sampling program.

#### 3.2.2.1 Development of the Screener Questionnaire Sample Frame

In order to gather all available information on the TECI, the Agency could have mailed Screener Questionnaires to all 11,900 facilities in the TECI site identification database; however, the Agency decided that a sample size of 4,000 would sufficiently represent the variety of technical and economic characteristics of the TECI and meet the objectives of the Screener Questionnaire while minimizing the burden to both industry and government. Therefore, a database containing information on potential TEC facilities was developed from a sample of 4,000 facilities (including both tank interior cleaning and aircraft deicing facilities). Development of the statistical sample frame for the Screener Questionnaire is discussed below.

Facilities were selected from the TECI site identification database to receive a Screener Questionnaire based upon two factors: (1) facility type (i.e., tank truck cleaning, rail tank car cleaning, tank barge cleaning, transfer facilities, and aircraft segment), and (2) probability of performing TEC operations (level of assurance, as discussed in Section 3.2.1). This selection approach divides the TECI into 15 distinct categories or cells (i.e., five facility types times three levels of assurance).

Since facilities that were specifically identified as performing TEC operations were assigned a high level of assurance, all records in the TECI site identification database with a high level of assurance were selected for the mailing list. The initial sample size selected from the remaining cells was calculated using the following equation (2), which minimizes the statistical variance for a fixed total sample size:

$$n_h = n \frac{N_n \sqrt{P_h Q_h}}{\Sigma N_h \sqrt{P_h Q_h}} \tag{1}$$

where:

| | | |
|---|---|---|
| h | = | Cell (e.g., barge-medium) |
| n | = | Total number of facilities remaining to be allocated [4,000 - 1,211 (high) = 2,789] |
| $n_h$ | = | Sample size for each cell |
| $N_h$ | = | Total number of facilities in each cell for which records are available |
| $P_h$ | = | Probability of performing TEC operations |
| $Q_h$ | = | $1 - P_h$ |

The Agency estimated that 15% of facilities with a low level of assurance perform TEC operations, and assigned a $P_h$ value of 0.15 to these facilities. This estimate was based on contacts with a representative sample of facilities in the TECI, contacts with trade associations, and information contained in facility identification sources. Similarly, a $P_h$ value of 0.50 was assigned to the medium level-of-assurance facilities since the Agency estimated that 50% of these facilities perform TEC operations.

The Agency performed statistical precision estimates based on the sample cell sizes determined by equation (1) and the assigned $P_h$ value for the medium and low level-of-assurance cells. These precision estimates predicted unacceptably high statistical variances for cells with a medium level of assurance and less than 400 records in the TECI site identification database (rail-medium, transfer-medium, and barge-medium). Therefore, all records within these cells were selected for the mailing list.

Equation (1) was then reapplied to the remaining cells from which random samples would be selected. The total number of facilities to be allocated, n, was revised from 2,789 to 2,205 after eliminating the three additional census cells (i.e., 4,000 - 1,211 (high) - 218 (rail-medium) - 357 (barge-medium) - 9 (transfer-medium) = 2,205). Table 3-3 summarizes the final distribution of facilities in the TECI Screener Questionnaire mailing list by facility type and level of assurance.

Facilities in the TECI site identification database were then randomly selected for the noncensus cells, with the exceptions of the truck-medium and transfer-low cells. For the truck-medium cell, a “stratified” random selection of facilities, based on source, was required because the truck-medium cell includes facilities identified by several sources from which only a fraction of the potential records available were received as well as by several sources for which all available records were received (i.e., randomly selecting facilities from this cell, without consideration of source, would bias sources for which a larger percentage of the records available were received). To develop an accurate statistical representation of this cell, the Agency calculated a sample size for each source. Facilities in the truck-medium cell were then selected randomly within each source using the individually calculated, source-specific sample size, with the sum of the source-specific sample sizes equalizing to the total number of facilities to be selected from the truck-medium cell as calculated using equation (1).

Only two facilities were available for selection from the transfer-low cell. Due to the low probability that the transfer-low facilities perform TEC operations, EPA chose only one of the two facilities to receive a questionnaire.

#### 3.2.2.2 Development of the Screener Questionnaire

The Agency requested the following site-specific information for calendar year 1992 in the four-page Screener Questionnaire:

- Facility name and address;
- Contact person;
- Business entity that owns the facility;
- Number of TEC facilities operated by the business entity;
- Whether the facility performs TEC operations;
- Whether the facility generates TEC process wastewater;
- TEC process wastewater discharge information;
- Number of tank interior cleanings performed by tank type;
- Percentage of tank interior cleanings performed by cargo type;
- Types of cleaning processes performed;
- Facility total average daily wastewater discharge;
- Wastewater treatment technologies or disposal methods;
- Facility operational structure (e.g., carrier, independent);
- Number of employees - total and TEC-related; and
- Annual revenues - total and TEC-related.

#### 3.2.2.3 Administration of the Screener Questionnaire

In December 1993, the Agency mailed 3,240 Screener Questionnaires to potential tank interior cleaning facilities. This Screener Questionnaire mail-out comprised the statistical sample frame described in Section 3.2.2.1. Additionally, EPA mailed out Screener Questionnaires to 28 facilities that transport hazardous waste in order to obtain additional data for use in determining their applicability under the TECI guideline. For the same reason, EPA mailed one Screener Questionnaire to a facility that cleans the interiors of ocean/sea tankers. This facility had been identified subsequent to development of the TECI site identification database. Since these 29 facilities were not included in the statistical sample population, responses from these facilities were not used in calculating national estimates for the TECI. Table 3-4 summarizes the Screener Questionnaire mail-out, follow-up, and receipt activities.

EPA established a toll-free helpline to assist Screener Questionnaire recipients in completing the questionnaire. The helpline received calls from 698 questionnaire recipients.

Following receipt of the Screener Questionnaire responses, an initial review was performed to determine whether the facility indicated that TEC operations were performed at their location. Facilities that indicated that TEC operations were performed at their location and that they generated TEC wastewater were preliminarily designated "in-scope" facilities. Facilities that indicated that TEC operations were performed at their location but that they did not generate TEC wastewater were designated "dry" facilities. Facilities that indicated that TEC operations were not performed at their location were designated "out-of-scope" facilities. Responses from a total of 754 in-scope facilities and 24 dry facilities were received by the Agency. An additional 245 Screener Questionnaires for which responses were not received were determined to be either inactive or out-of-scope based on telephone calls or other follow-up activities. Responses for 90 facilities, approximately two percent of the mailing list, were unaccounted for (i.e., certified mail cards not returned, Screener Questionnaire returned as undeliverable, and follow-up phone calls not returned). The remaining responses were from out-of-scope facilities.

Screener Questionnaire responses from in-scope facilities were then entered into the Screener Questionnaire database. The quality of responses in the database was evaluated by performing a number of database range and logic checks. For example, one check verified that the total number of facility employees exceeded the number of employees that perform TEC-related activities. The Agency followed up with facilities that "failed" a prioritized list of range and logic checks to resolve missing or contradictory information.

### 3.2.2.4 Calculation of National Estimates

Each source used to develop the TECI site identification database was considered a statistical "stratum" during development of the Screener Questionnaire sample frame. Each surveyed facility in a stratum represents a specific number of facilities in the national population. For example, if a surveyed facility falls within stratum "A" and the "weight" of that stratum is 5, the responses received from that facility represent a total of five facilities in the overall TECI population. Following receipt of the Screener Questionnaire responses (to account for nonrespondents), EPA determined a weight associated with each stratum using the following equation:

$$\text{Stratum Weight} = \frac{N_h}{n_h} \tag{2}$$

where:

| | | |
|---|---|---|
| $N_h$ | = | Total number of facilities in stratum |
| $n_h$ | = | Number of facilities that responded to the Screener Questionnaire |

Subsequent to administration of the Screener Questionnaire, the Agency reviewed the Screener Questionnaire strata and specific facility assignments within the strata and determined that post-stratification of certain sources (strata) and adjustment of certain facility assignments within the strata would improve the statistical confidence of the strata and reduce sample bias within the original sample frame. Post-stratification adjustments made are described below. Additional details concerning post-stratification of the Screener Questionnaire sample frame are included in reference 3.

- Some facilities were identified by multiple sources in multiple transportation types applicable to the TECI (e.g., truck facility in one source and rail facility in another source). For the Screener Questionnaire sample frame, these facilities were classified as "transfer" facilities. During post-stratification, since these facilities are not characteristically different from other facilities in the primary source (facilities identified by multiple sources were assigned a primary source, generally based on the

- source level of assurance), they were reassigned to the original tank type in the primary source for scale-up purposes.

- Facilities identified as performing TEC operations based on telephone contacts during development of source level-of-assurance assignments had been classified as “high”, regardless of the original source, because EPA knew (i.e., had a high level of assurance) that these facilities performed TEC operations. Classifying these facilities as “high” biased the national estimates; therefore, these facilities were post-stratified to their original source, facility type, and level of assurance group.

- In order to reduce the variability of the national estimates, several Screener Questionnaire strata with similar weighting factors were collapsed into a single strata and assigned a conglomerated weighting factor for the entire collapsed strata. For example, all censused Screener Questionnaire strata (e.g., truck-high, rail-high, barge-medium), with a few exceptions, were collapsed into a single stratum.

After incorporating the post-stratification adjustments described above, the Screener Questionnaire sample frame included 13 strata, which are listed in Table 3-5. EPA recalculated the survey weighting factors for each of the revised Screener Questionnaire strata and estimated that the total number of facilities in the TECI was 2,739 facilities. These data are also listed in Table 3-5.

### 3.2.3 1994 Detailed Questionnaire for the Transportation Equipment Cleaning Industry (Detailed Questionnaire)

EPA designed and administered a Detailed Questionnaire to a statistical sample of eligible TEC facilities from the Screener Questionnaire respondents. The objectives of the Detailed Questionnaire were to collect detailed site-specific technical and economic information pertaining to the year 1994 to:

- Develop an industry profile;
- Characterize TEC processes, industry production (i.e., number and type(s) of tanks cleaned), and water usage and wastewater treatment;
- Perform an industry subcategorization analysis;
- Develop pollutant loadings and reductions estimates;
- Develop compliance cost estimates; and
- Determine the impacts of the rulemaking on the TECI.

#### 3.2.3.1 Development of the Detailed Questionnaire Sample Frame

Facilities responding to the Screener Questionnaire were preliminarily identified as "in-scope" if they performed TEC operations that generated wastewater in 1992. As shown in Table 3-4, EPA received Screener Questionnaire responses from 754 in-scope facilities. Twenty-four of these responses were from the second mailing to 29 facilities described in Section 3.2.2.3 that were not part of the statistical sampling effort. Another 16 facilities indicated that although they performed TEC operations in 1992, they would not be performing these operations in the future. Therefore, 40 in-scope respondents were ineligible for selection to receive a Detailed Questionnaire and were not included in the Detailed Questionnaire sample design. The 714 remaining in-scope respondents were then used as a basis for the sample design.

Based on responses to the Screener Questionnaire, four variables were considered in designing the Detailed Questionnaire sample draw. The four variables were tank type, operational structure, number of employees, and wastewater treatment in place. Each of the 714 potential Detailed Questionnaire recipients was classified based on these four variables as listed below. Facilities with multiple classifications were assigned a primary classification based on their predominant tank type cleaned, predominant operational structure, and highest level of wastewater treatment with some exceptions noted below.

<u>Tank Type</u>

Truck
Rail
Barge
Intermodal Tank Container
Intermediate Bulk Container
Tanker
Land-Water (clean barges or tankers and any other tank types)
Water (clean barges and tankers and no other tank types)
Land (clean any combination of trucks, intermodal tank containers, intermediate bulk containers, or rail cars with no predominant tank type cleaned)

<u>Operational Structure</u>

Builder/Leaser
Carrier
Independent
Shipper
Not Elsewhere Classified (i.e., no predominant operational structure or operational structure not provided)

<u>Number of Employees</u>

Small (varies by operational structure)
Large (varies by operational structure)

<u>Level of Wastewater Treatment in Place</u>

None or Pretreatment
Primary
Secondary
Advanced
Recycle/Reuse

Additional details concerning the methodology used to classify facilities within these four variables are included in references 4 and 5.

The following criteria were used to select the 275 Detailed Questionnaire recipients:

- Select a random sample of facilities, stratified by tank type, from the TECI Screener Questionnaire census stratum;
- Select all facilities in the TECI Screener Questionnaire noncensus strata considered to be primarily composed of operational structures other than “shippers”;
- Select a random sample of facilities in the TECI Screener Questionnaire noncensus strata considered to be primarily shippers;
- Select all facilities with the tank type “land-water”, “tanker”, and “water”;
- Select a random sample of at least 20 barge facilities; and
- Select all facilities in strata with two or fewer facilities comprising small businesses (i.e., with small number of employees for the operational structure).

The sampling strategy was designed to meet two objectives most effectively: (1) to ensure that at least one facility was sampled from most cells (i.e., combinations of the four variables previously listed), and (2) to ensure that the variance around the national estimates would not be grossly inflated in attempting to meet the first objective. The design sampled relatively fewer facilities in strata primarily composed of shippers than in strata primarily composed of nonshippers, because, in many cases, the TEC wastewater generated by shippers would be covered by other effluent guidelines. The last criterion described above was included to evaluate cost impacts on small businesses.

To achieve the sample draw criteria listed above, the Detailed Questionnaire stratification consisted of 23 strata created from the 13 Screener Questionnaire strata described in Section 3.2.2.4. Table 3-6 lists the 23 Detailed Questionnaire strata and the distribution of facilities in the TECI Detailed Questionnaire mailing list by these strata.

As part of the standard process of developing the Detailed Questionnaire, nine facilities were selected and sent pretest questionnaires. EPA decided that data from the pretest Detailed Questionnaire responses would not be used in national estimates because they represented data from the year 1993 rather than 1994, the baseline year for the Detailed Questionnaire data. The Detailed Questionnaire sample design treated the facilities that received a pretest questionnaire as eligible for sample selection with the understanding that, if selected, a replacement facility would be chosen. Four questionnaire pretest facilities were selected during the sample draw and were replaced. One of the four facilities was a member of a stratum from which all facilities were to receive a Detailed Questionnaire (i.e., a census stratum). For this stratum, the responses of the facilities remaining in the stratum were used to represent responses from the pretest facility (i.e., the survey weight for the census stratum was revised from 1 to a weight of more than 1).

#### 3.2.3.2 Development of the Detailed Questionnaire

The Agency developed the Detailed Questionnaire to collect information necessary to develop effluent limitations guidelines and standards for the TECI. The questionnaire was developed in conjunction with EPA's Office of Pollution Prevention and EPA's Office of Solid Waste. A draft version of the questionnaire was sent to nine pretest facilities to complete and to several industry trade associations and companies for review and comment. Comments from these facilities, trade associations, and companies were incorporated into the final version of the Detailed Questionnaire.

The Detailed Questionnaire included two parts:

1. Part A: Technical Information

    - Section 1: General Facility Information
    - Section 2: TEC Operations
    - Section 3: Wastewater Generation, Treatment, and Discharge
    - Section 4: Wastewater Characterization Data
    - Section 5: Pollution Prevention and Water Conservation
    - Section 6: Questionnaire Certification for Part A - Technical Information

2. Part B: Financial and Economic Information

— Section 1: Facility Identification
— Section 2: Facility and TEC Financial Information
— Section 3: Business Entity Financial Information
— Section 4: Corporate Parent Financial Information

Part A, Section 1 requested information necessary to identify the facility and to determine wastewater discharge locations. The information collected by this section included facility name, mailing and physical facility address, technical contract person and address, facility layout diagram, age of facility, major modifications made to the facility, environmental permits held by the facility, wastewater discharge location(s), and whether the facility is regulated by any existing or upcoming national categorical limitations or standards.

Part A, Section 2 requested information necessary to develop an industry profile, characterize TEC processes, determine industry production (i.e., number and type(s) of tanks cleaned), and perform an industry subcategorization analysis. The information collected included a TEC process flow diagram, description of TEC processes, TEC operating days per year and hours per day, types and numbers of tanks cleaned, cleaning processes performed, cleaning solutions used and disposition of spent cleaning solutions, general cargo types and specific cargos cleaned, heel generation and disposition, other operations performed (e.g., tank hydrotesting, exterior washing), and air emissions from TEC operations.

Part A, Section 3 requested information regarding wastewater generation, recycle/reuse, and discharge and to determine wastewater treatment in place. This information was used to develop regulatory compliance cost estimates. The information collected in this section included a wastewater generation, treatment, and discharge diagram; wastewater streams generated and volume; wastewater streams discharged, volume, and destination; wastewater recycle/reuse streams and destination; wastewater treatment unit operations; wastewater treatment residuals generated, volume, disposition, and costs; wastewater treatment system capital and annual costs; and space availability at the facility.

Part A, Section 4 requested information concerning the availability of wastewater stream characterization data and/or treatability data. This information was used to determine whether supplemental analytical data requests would be required.

Part A, Section 5 requested information concerning pollution prevention and water conservation activities. This information was used to identify applicable pollution prevention and water conservation technologies for consideration in developing regulatory technology options. The information collected included submittal of any facility pollution prevention policies or plans, wastewater pollution prevention activities performed and their impacts, water conservation practices used and their impacts, solid waste pollution prevention activities performed and their impacts, and air pollution prevention activities performed and their impacts.

Part A, Section 6 included a certification form indicating that information submitted to EPA was true, accurate, and complete; a check box indicating whether any portion of questionnaire responses were considered confidential business information; and a check box indicating whether contract personnel perform TEC operations or whether TEC operations are performed by a mobile facility.

Part B, Section 1 requested information necessary to identify the facility and identify the facility's corporate hierarchy. The information collected by this section included facility name, mailing and physical facility address, county, street names of closest intersection, contact person and address, types of TEC operations performed, corporate hierarchy, corporation type, and facility type.

Part B, Section 2 requested information necessary to develop an industry economic profile and to assess facility-level economic impacts associated with TECI effluent guidelines. The information collected by this section included primary and secondary SIC codes, first month of facility fiscal year, whether the facility performs non-TEC operations and types, purpose of TEC and non-TEC operations, cost increase that would lead to using commercial tank cleaning sources, percentage of commercial tank interior cleanings performed, and how TEC costs are recovered. The section also requested why clients use TEC services, whether the facility rejects cargos, who accepts rejected cargos, factors that affect TEC operations used, number and types of tanks cleaned, impact of 1993 flooding on TEC revenues and costs, distance to nearest commercial TEC facility, sensitivity of clients to price increases, discount rate of borrowed money, balance sheet information including assets and liabilities, TEC revenue and cost information, income statement information, assessed value, number of employees, and financial statements.

Part B, Section 3 requested information necessary to assess business entity-level economic impacts associated with TECI effluent guidelines. The information collected by this section included name and mailing address, primary and secondary SIC codes, business entity type, list of TEC facilities operated by the business entity and TEC operations performed, year the business entity gained control of facility, and first month of fiscal year. The section also requested top revenue-generating activities, discount rate of borrowed money, balance sheet information including assets and liabilities, TEC revenue and cost information, financial statement information, number of employees, and financial statements.

Part B, Section 4 requested information necessary to assess corporate parent-level economic impacts associated with potential TECI effluent guidelines. The information collected by this section included name and mailing address, primary and secondary SIC codes, year the corporate parent gained control of the business entity, corporate parent type, and financial statements.

A blank copy of the Detailed Questionnaire and copies of the Detailed Questionnaire responses (nonconfidential portions) are contained in the administrative record for this rulemaking. Further details on the types of information collected and the potential use of the information are contained in the Information Collection Request for this project (6). Detailed information on Part B is presented in the economic analysis report (7).

### 3.2.3.3 Administration of the Detailed Questionnaire

In April 1995, the Agency mailed 275 Detailed Questionnaires to in-scope TEC facilities identified from Screener Questionnaire responses. This Detailed Questionnaire mail-out comprised the statistical sample. EPA evaluated the specific facilities selected to receive the Detailed Questionnaire and determined that the Detailed Questionnaire sample population would not include a sufficient number of facilities that operate potential BAT end-of-pipe treatment technologies. To obtain additional detailed wastewater treatment information for use in developing regulatory options and estimating compliance cost, EPA mailed an additional 12 Detailed Questionnaires to facilities that operate potential BAT end-of-pipe treatment technologies. Since these 12 facilities were not included in the statistical sample population, responses from these facilities were not used in calculating national estimates for the TECI. Table 3-7 summarizes the Detailed Questionnaire mail-out, follow-up, and receipt activities.

EPA established toll-free helplines, one for Part A and one for Part B, to assist Detailed Questionnaire recipients in completing the questionnaire. The Part A helpline received a total of 477 calls from 192 facilities. The Part B helpline received a total of 161 calls.

The Agency completed a detailed engineering review of Part A of the Detailed Questionnaire responses to evaluate the completeness, accuracy, and consistency of information provided by the respondents, and to perform additional response coding to facilitate data entry and analysis of questionnaire responses. The TEC Questionnaire Part A Coding/Review Checklist (8) outlines the processes used by engineering reviewers to evaluate and code the questionnaire responses. The Data Element Dictionary for Part A of the U.S. Environmental Protection Agency 1994 Detailed Questionnaire for the Transportation Equipment Cleaning Industry Database (9) contains information codes reported either by the respondents or added by the engineering reviewers during questionnaire response evaluation. The Agency contacted respondents by telephone or letter who provided inaccurate, incomplete, or contradictory technical information.

The Agency entered the questionnaire responses into the Detailed Questionnaire database, the structure of which is documented in the Detailed Questionnaire Data Element Dictionary referenced above. The database was developed in FoxPro™; however, the database was converted to SAS® for other users to access. After engineering review and coding, questionnaire responses were double key entered using a data entry and verification system, also developed in FoxPro™. Additional documentation concerning the data entry and verification system is contained in the administrative record for this rulemaking. Inconsistencies in double key entry were verified by the questionnaire reviewers.

After population of the questionnaire database, the Agency performed range and logic checks to ensure that the database was complete and accurate. During questionnaire analysis, additional questionnaire database "cleanup" was performed to identify and resolve any additional data that were questionable based on engineering judgement. Responses not standardized during coding were standardized, where appropriate, to facilitate questionnaire analysis.

#### 3.2.3.4 Calculation of National Estimates

Each surveyed facility in a stratum represents a specific number of facilities in the national population. Therefore, EPA determined a weight associated with each stratum. For example, if a surveyed facility falls within stratum "A" and the weight of that stratum is 5, the responses received from that facility represent a total of five facilities in the overall TECI population. EPA calculated the survey weighting factors for each of the Detailed Questionnaire strata using equation (2) in Section 3.2.2.4. Details concerning calculation of the Detailed Questionnaire survey weights are included in reference 13. Table 3-8 shows the Detailed Questionnaire strata and their associated strata weights. Calculation of survey weighting factors, which account for nonrespondents, is described in reference 10.

During review of the Detailed Questionnaire responses, the Agency classified each facility within one of the following three categories:

1. **Direct and Indirect Discharge Facilities:** TEC facilities that discharge wastewater to surface waters of the United States (direct discharge) or to a publicly-owned treatment works (POTW) (indirect discharge).

2. **Zero Discharge Facilities:** TEC facilities that do not discharge wastewater to surface waters or to a POTW, and may instead haul wastewater off site to a centralized waste treater, practice total waste water recycle/reuse, or land apply wastewater.

3. **Previously Regulated (also called captive facilities):** TEC facilities that are covered by existing or upcoming effluent guidelines. TEC operations are a very small part of their overall operations. These facilities include facilities regulated under the Organic Chemicals, Plastics, and Synthetic Fibers Effluent Guideline, the Dairies Effluent Guideline, the Centralized Waste Treaters Effluent Guideline, and the Internal Waste Incinerators Effluent Guideline. These facilities will not be covered by the TECI effluent guideline as long as they commingle and treat the TEC wastewater with their major source wastewater.

National estimates of the total population of these three TEC facility types are listed in the following table:

| Facility Type | Number of Sample Population Responses Received | Estimated Number of Facilities in Total Population |
|---|---|---|
| Direct and Indirect Discharge Facilities | 93 | 692 |
| Zero Discharge Facilities | 49 | 547 |
| Previously Regulated Facilities | 34 | 1,166 |

## 3.3 Summary of EPA's TECI Site Visit Program from 1993 Through 1996

The Agency conducted 39 engineering site visits (13 of which were conducted concurrently with sampling) at 38 facilities to collect information about TEC processes, water use practices, pollution prevention practices, wastewater treatment technologies, and waste disposal methods. These facilities were also visited to evaluate potential sampling locations (as described in Section 3.4). In general, the Agency visited facilities that encompass the range of

TEC facilities. The following table summarizes the number of site visits performed by primary tank type cleaned.

| Primary Tank Type Cleaned | Number of Facilities Visited |
|---|---|
| Truck | 19 |
| Rail | 10 |
| Barge | 7 (one facility visited twice) |
| Tanker | 1 |
| Closed-Top Hopper Barge | 1 |

### 3.3.1 Criteria for Site Selection

The Agency based site selection on information submitted in response to the TECI Screener and Detailed Questionnaires. The Agency also contacted trade association representatives to identify representative TEC facilities for site visits. The Agency used the following five criteria to select facilities that encompassed the range of TEC operations, wastewater characteristics, and wastewater treatment practices within the TECI.

1. Tank Types Cleaned: Truck, Rail, Barge, Intermodal Tank Container, Intermediate Bulk Container, Tanker, Closed-Top Hoppers;

2. Operational Structure: Independent, Carrier, Shipper, Combinations;

3. Treatment: Advanced, Secondary, Primary, None;

4. Cargo Types Cleaned: Chemicals, Food grade, Petroleum, Combinations; and

5 Discharge Status: Direct, Indirect, 100% Wastewater Recycle/Reuse, Contract Haul.

Facility-specific selection criteria are contained in site visit reports (SVRs) prepared for each facility visited by EPA. Exceptions include site visits performed concurrently with sampling in which case facility-specific selection criteria are contained in sampling episode reports (SERs) prepared for each facility sampled by EPA. The SVRs and SERs are contained in the administrative record for this rulemaking.

### 3.3.2 Information Collected

During the site visits, EPA collected the following types of information:

- General facility information including size and age of facility, number of employees, operating hours per day and days per year, number of cleaning bays or docks, facility clients, and non-TEC operations;
- Types of tanks and cargos cleaned, number of tanks cleaned by cargo type, reasons for tank cleaning, most difficult cargos to clean, whether and why tanks are rejected;
- Typical cleaning processes used by tank and cargo type;
- Types of cleaning equipment used and operating volume and pressure;
- Heel removal, management, volume, and disposition;
- Cleaning solutions used, temperature, whether cleaning solutions are recirculated, and disposition of spent cleaning solutions;
- Types and disposition of wastewater generated;
- Volumes of wastewater generated per tank cleaned by tank and cargo type;
- Types of in-process source reduction and recycling performed;
- Wastewater treatment units and operation including volume, flow rate, and treatment chemicals used, amounts, and purpose;
- Wastewater discharge location and monitoring requirements;
- Types, volume, and disposition of wastewater treatment residuals;

- Identification of potential sampling points and sampling methodologies; and
- Logistical and health and safety information required for sampling.

This information is documented in the SVRs or SERs for each visited facility.

## 3.4 Summary of EPA's TECI Sampling Program from 1994 through 1996

The Agency conducted 20 sampling episodes at 18 facilities (two facilities were sampled twice). Twelve of these sampling episodes were conducted to obtain untreated TEC process wastewater and treated final effluent characterization data from facilities representative of the variety of TEC facilities. Wastewater treatment sludge was also characterized at two of these twelve facilities to determine whether the sludge was hazardous. Each of these "characterization" sampling episodes encompassed one sampling day. Eight additional sampling episodes were conducted to obtain both untreated TEC process wastewater characterization data and to evaluate the effectiveness and variability of wastewater treatment units used to treat TEC wastewater. Of these 8 sampling episodes, 1 was conducted for 1 day, 2 were conducted for 3 days each, 4 were conducted for 4 days each, and 1 was conducted for 5 days. The following table summarizes the number of sampling episodes performed by primary tank type cleaned.

| Primary Tank Type Cleaned | Number of Facilities Sampled |
|---|---|
| Truck | 7 |
| Rail | 5 |
| Barge | 7 (two facilities sampled twice) |
| Closed-Top Hopper Barge | 1 |

At several facilities, sampled TEC waste streams were commingled with other wastewater sources including exterior cleaning wastewater, boiler wastewater, and contaminated stormwater. Samples were typically analyzed for volatile organics, semi-volatile organics, organo-halide pesticides, organo-phosphorus pesticides, phenoxy-acid herbicides, dioxins and furans, metals, and classical wet chemistry parameters. The results of this data collection are discussed in Sections 6.0, 7.0, and 8.0.

### 3.4.1 Criteria for Site Selection

The Agency based site selection on information submitted in response to the TECI Screener and Detailed Questionnaires or information collected during TECI engineering site visits. The Agency used the same five general criteria to select facilities for sampling as that used to select facilities for site visits:

1. Tank Types Cleaned: Truck, Rail, Barge, Closed-Top Hoppers;
2. Operational Structure: Independent, Carrier, Shipper;
3. Cargo Types Cleaned: Chemicals, Food grade, Petroleum;
4. Treatment: Advanced, Secondary, Primary, None; and
5. Discharge Status: Direct, Indirect, 100% Wastewater Recycle/Reuse.

Facilities sampled during the "characterization" sampling episodes were selected primarily based on tank type and cargo type cleaned, for the overall purpose of characterizing wastewater that was typical of the TECI and representative of the variety of technical and economic characteristics of the TECI. Facilities sampled during the wastewater treatment evaluation sampling episodes were selected primarily based on use of potential BAT and PSES control technologies and widest possible coverage of the TECI effluent guidelines subcategories. Facility-specific selection criteria are contained in sampling episode reports (SERs) and/or sampling and analysis plans (SAPs) prepared for each facility sampled by EPA. The SERs and SAPs are contained in the administrative record for this rulemaking.

### 3.4.2 Information Collected

In addition to wastewater and solid waste samples, the Agency collected the following information during each sampling episode:

- Dates and times of sample collection;
- Flow data corresponding to each sample;
- Production data (i.e., number of tanks cleaned per sampling day) corresponding to each wastewater sample;
- Design and operating parameters for source reduction, recycling, and treatment technologies evaluated during sampling; and
- Temperature, free chlorine, and pH of the sampled waste streams.

All data collected during sampling episodes are documented in the SER prepared for each sampled facility. SERs are included in the administrative record for this rulemaking. The SERs also contain technical analyses of treatment system performance (where applicable).

### 3.4.3 Sample Collection and Analysis

During the sampling episode, teams of EPA personnel and EPA contractor engineers, scientists, and technicians collected and preserved samples and shipped them to EPA contract laboratories for analysis. Sample collection and preservation were performed according to EPA protocols as specified in the TEC Quality Assurance Project Plan (QAPP) (11) and the EAD Sampling Guide (12).

In general, composite samples were collected from wastewater streams with compositions that were expected to vary over the course of a production period (e.g., untreated TEC process wastewater prior to equalization). Grab samples were collected from streams that were not expected to vary over the course of a production period (e.g., wastewater streams collected subsequent to extended equalization). Composite samples of wastewater treatment sludge were also collected. EPA collected the required types of quality control samples as specified in the TEC QAPP, such as trip blanks, equipment blanks, and duplicate samples, to verify the precision and accuracy of sample analyses. The list of analytes for each waste stream, analytical methods used, and the analytical results, including quality control samples, are included in the SERs prepared for each facility sampled.

## 3.5 Existing Data Sources

In developing the TECI effluent guidelines, EPA evaluated the following existing data sources:

- EPA databases from development of effluent guidelines for other industries;
- The Office of Research and Development (ORD) Risk Reduction Engineering Laboratory (RREL) treatability database;
- The Fate of Priority Pollutants in Publicly Owned Treatment Works (50 POTW Study) database;
- Lists of potential TEC facilities from state and local agencies;
- EPA's Permit Compliance System and Industrial Facilities Discharge and Databases; and
- U.S. Navy bilge wastewater characterization data.

These data sources and their uses for the development of the TECI effluent guidelines are discussed below.

### 3.5.1 Other EPA Effluent Guidelines Databases

In developing effluent guidelines for Centralized Waste Treaters, EPA collected wastewater samples to characterize oily wastewaters. Oily wastewater characterization data were not collected during sampling episodes conducted at a TEC facility in the Truck/Petroleum Subcategory; however, pollutant loadings and pollutant reduction estimates for these subcategories included off-site disposal of oily wastewater. EPA reviewed the sampling episode reports for oily wastewater samples collected at Centralized Waste Treaters and determined that some data from this program were appropriate for transfer to the TECI effluent guidelines development effort. Reference 13 provides a detailed description of the source of the oily wastewater characterization data and EPA's rationale for transfer of the data to the TECI effluent guidelines development effort.

### 3.5.2 EPA's Risk Reduction Engineering Laboratory Treatability Database

EPA's Office of Research and Development (ORD) developed the Risk Reduction Engineering Laboratory (RREL) treatability database to provide data on the removal and destruction of chemicals in various types of media, including water, soil, debris, sludge, and sediment. One component of the RREL database is treatability data from POTWs for various pollutants. This database includes physical and chemical data for each pollutant, the types of treatment used to treat the specific pollutants (predominantly activated sludge and aerobic lagoons for POTWs), the type of media treated (domestic wastewater for POTWs), the scale of the treatment system (i.e., full-, pilot-, or bench-scale), treatment concentrations achieved, treatment efficiency, and source of treatment data. EPA used this database to assess removal by POTWs of TECI pollutants effectively removed and to select pollutants to be regulated (see Section 7.0).

### 3.5.3 EPA's Fate of Priority Pollutants in Publicly Owned Treatment Works Database

In September 1982, EPA published the Fate of Priority Pollutants in Publicly Owned Treatment Works (14), referred to as the 50 POTW Study. The purpose of this study was to generate, compile, and report data on the occurrence and fate of the 129 priority pollutants in 50 POTWs. The report presents all the data collected, the results of preliminary evaluations of these data, and the results of calculations to determine the following:

- The quantity of priority pollutants in the influent to POTWs;
- The quantity of priority pollutants discharged from POTWs;
- The quantity of priority pollutants in the effluent from intermediate process streams; and
- The quantity of priority pollutants in the POTW sludge streams.

EPA used the data from this study to assess removal by POTWs of TECI pollutants of concern.

### 3.5.4 State and Local Agencies

A number of state and local agencies provided the Agency with lists of facilities within their jurisdiction that directly discharge wastewaters and were identified as either performing TEC operations or reporting under an SIC code for facilities that own and/or operate transportation equipment. The following agencies supplied lists of potential TEC facilities: Alabama Department of Environmental Management, Baton Rouge Department of Public Works, City of Houston Industrial Wastewater Service, Kentucky Department of Environmental Protection, Metropolitan Water Reclamation District of Chicago, and State of Mississippi Permitted Facilities.

### 3.5.5 EPA's Permit Compliance System and Industrial Facilities Discharge Databases

The Agency searched the Permit Compliance System (PCS) and the Industrial Facilities Discharge (IFD) databases to identify facilities that potentially perform TEC operations (see Section 3.2.1). These databases identify facilities that discharge wastewater by four-digit SIC code. Facilities in SIC codes potentially applicable to the TECI were entered into the TECI site identification database.

### 3.5.6 U.S. Navy Bilge Wastewater Characterization Data

Several facilities in the Barge/Chemical Subcategory for which compliance costs were estimated commingle non-TEC wastewater with TEC wastewater prior to treatment. The non-TEC wastewater of concern consists primarily of marine wastewaters such as bilge wastewater and ship-building wastewater. The U.S. Navy published a report titled "The Characterization of Bilge Water Aboard Navy Ships." EPA reviewed the report for bilge wastewater characterization data and determined that these data were appropriate for use in characterizing marine wastewater streams treated by facilities in the Barge/Chemical Subcategory. A detailed description of the source of the bilge wastewater data and EPA's rationale for transfer of the data to the TECI effluent guidelines development effort is provided in reference 15.

## 3.6 Summary of Publicly-Owned Treatment Works Data

In October 1993 the Association of Metropolitan Sewerage Authorities (AMSA) provided EPA with data from POTW members on industrial users that conducted TEC operations in 1992. The POTWs provided the following information: (1) POTW contact, location, and limits; (2) industrial user information including TEC facility contact, location, average wastewater discharged in gallons per day, and the types of TEC operations performed; (3) industrial user sampling point information; (4) industrial user treatment technologies employed; (5) industrial user pollution prevention practices; and (6) industrial user sampling data collected by the POTW or the industrial user.

EPA considered using the AMSA data as a source in developing the TECI site identification database (see Section 3.2.1); however, because the AMSA data were not received until after the TECI site identification database was finalized, EPA decided not to use these data in developing the database. In addition, the sampling data were not used because very little sampling data were provided and because influent and effluent data were not paired, precluding use to determine treatment performance efficiencies. For these reasons, EPA decided not to use the AMSA data in the development of the proposed rule.

## 3.7 References[1]


1. U.S. Environmental Protection Agency, Office of Water Regulations and Standards. Preliminary Data Summary for the Transportation Equipment Cleaning Industry. EPA 440/1-89/104, September 1989 (DCN T10201).

2. Cochran, W.S. Sampling Techniques. John Wiley & Sons, 1977. p. 108.

3. Eastern Research Group, Inc., Development of Survey Weights for the U.S. Environmental Protection Agency Tank and Container Interior Cleaning Screener Questionnaire. May 15, 1998 (DCN T11000).

4. Radian Corporation. Transportation Equipment Cleaning Industry (TECI) Tank and Aircraft Screener Database Postings. Memorandum from Debbie Falatko, Radian Corp., to Gina Matthews, U.S. EPA, June 30, 1995 (DCN T10269).

5. Science Applications International Corporation (SAIC). Final Transportation Equipment Cleaning Industry Detailed Questionnaire Sample Design Report. May, 1998 (DCN T11100).

6. U.S. Environmental Protection Agency. Information Collection Request, 1994 Detailed Questionnaire for the Transportation Equipment Cleaning Industry. November 1994 (DCN T09843).

7. U.S. Environmental Protection Agency. Economic Analysis of Proposed Effluent Limitations Guidelines and Standards for the Transportation Equipment Cleaning Category. EPA-821-B-98-012, May 1998.

8. Radian Corporation. TEC Questionnaire Part A Coding/Review Checklist. September 12, 1995 (DCN T10249).

9. Eastern Research Group, Inc. Data Element Dictionary for Part A of the U.S. Environmental Protection Agency 1994 Detailed Questionnaire for the Transportation Equipment Cleaning Industry. April 4, 1997 (DCN T10271).


[1] For those references included in the administrative record supporting the proposed TECI rulemaking, the document control number (DCN) is included in parentheses at the end of the reference.

10. SAIC. Statistical Methods for Calculating National Estimates. May 1998 (DCN T11101).

11. Radian Corporation. Draft Quality Assurance Project Plan for the Transportation Equipment Cleaning Industry. January 19, 1995 (DCN T10233).

12. Viar and Company. EAD Sampling Guide. June 1991 (DCN T10218).

13. Eastern Research Group, Inc. Development of Transportation Equipment Cleaning Industry Production Normalized Pollutant Loadings. Memorandum from Grace Kitzmiller, Eastern Research Group, Inc. to the TECI Rulemaking Record. May 6, 1998 (DCN T09981).

14. U.S. Environmental Protection Agency. Fate of Priority Pollutant in Publicly-Owned Treatment Works. EPA 440/1-82/303, September 1982 (DCN T10311).

15. Eastern Research Group, Inc. Development of Transportation Equipment Cleaning Industry Production Normalized Pollutant Loadings. Memorandum from Grace Kitzmiller, Eastern Research Group, Inc. to the TECI Rulemaking Record. May 6, 1998 (DCN T09981).

# Table 3-1

## Major Sources Used to Identify Potential TEC Facilities by Tank Type and Business Operational Structure

| | Tank Trucks, Closed-Top Hopper Trucks, Intermodal Tank Containers, and Intermediate Bulk Containers | Rail Tank Cars and Closed-Top Hopper Rail Cars | Inland Tank Barges, Closed-Top Hopper Barges, and Ocean/Sea Tankers | Transfer Facilities (Multiple Modes of Transportation) |
|---|---|---|---|---|
| Independent | Modern Bulk Transporter, 1993 Tank Cleaners Directory<br>Modern Bulk Transporter, 1993 Tank Trailer Repair Directory<br>Dun & Bradstreet | 1993 Repair Car Directory<br>1992 Pocket List of Railroad Officials<br>Dun & Bradstreet | 1993 Inland River Guide<br>Dun & Bradstreet<br>1993 American Waterways Shipyard Conference Shipyard Services Directory | Modern Bulk Transporter, 1993 Tank Cleaners Directory<br>1993 Inland River Guide |
| Carrier | Dun & Bradstreet<br>1993 National Motor Carriers Directory<br>Modern Bulk Transporter, 1993 Tank Cleaners Directory<br>Modern Bulk Transporter, 1992 Tank Container Depot Directory | Dun & Bradstreet | Dun & Bradstreet<br>1993 Inland River Guide<br>1993 Industrial and Hazardous Waste Transporters | 1993 National Motor Carriers Directory<br>Modern Bulk Transporter, 1992 Bulk Transfer Directory |
| Shipper | TRINC Users File<br>1993 Private Fleet Directory | 1992 Pocket List of Railroad Officials<br>1993 Private Fleet Directory<br>TRINC Users File | Dun & Bradstreet | TRINC Users File<br>1992 Pocket List of Railroad Officials<br>1993 National Motor Carriers Directory |
| Builder/Leaser | Modern Bulk Transporter, 1993 Tank Trailer Repair Directory | 1992 Pocket List of Railroad Officials<br>Union Tank Car List of Facilities | 1993 Inland River Guide | Modern Bulk Transporter, 1993 Tank Trailer Repair Directory |

# Table 3-2

## Sources Used to Identify Potential TEC Facilities

| Source | Level of Assurance | Source Code |
|---|---|---|
| **Potential Tank Barge Cleaning Facilities** | | |
| Telephone Contacts (All sources) | high | All |
| 1993 Inland River Guide (Tank barge cleaning operations specifically identified) | high | 14 |
| 1993 American Waterways Shipyard Conference (AWSC) Shipyard Services Directory (Tank barge cleaning operations specifically identified) | high | 1 |
| Metropolitan Water Reclamation District of Chicago List | high | 25 |
| 1993 Inland River Guide (Perform tank barge operations) | medium | 14 |
| 1993 AWSC Shipyard Services Directory (Perform tank barge operations) | medium | 1 |
| Kentucky Department for Environmental Protection List | medium | 15 |
| Dun and Bradstreet (Second order of SIC codes) (Assessed based on SIC code descriptions) | medium | 12 |
| Dun and Bradstreet (First order of SIC codes) (Assessed based on SIC codes descriptions) | medium | 11 |
| 1993 Industrial and Hazardous Waste Transporters | medium | 13 |
| TRINC Users File | medium | 23 |
| Dun and Bradstreet (First order of SIC codes) (Assessed based on SIC code descriptions) | low | 11 |
| Dun and Bradstreet (Second order of SIC codes) (Assessed based on SIC code descriptions) | low | 12 |
| EPA's Permit Compliance System | low | 18 |
| **Potential Rail Tank Car Cleaning Facilities** | | |
| 1992 Pocket List of Railroad Officials | high | 19 |
| Telephone Contacts (All sources) | high | All |
| Union Tank Car List of Facilities | high | 24 |
| Repair Car Directory, February, 1993 | high | 21 |
| Repair Car Directory, February, 1992 | high | 20 |
| Modern Bulk Transporter, February, 1993, Tank Trailer Repair Directory | high | 5 |
| 1993 Industrial and Hazardous Waste Transporters | medium | 13 |
| Alabama Department of Environmental Management List | medium | 3 |
| Kentucky Department for Environmental Protection List | medium | 15 |

# Table 3-2 (Continued)

| Source | Level of Assurance | Source Code |
|---|---|---|
| Mississippi Permitted Facilities | medium | 16 |
| Dun and Bradstreet (First order of SIC codes) (Assessed based on SIC code descriptions) | medium | 11 |
| Dun and Bradstreet (Second order of SIC codes) (Assessed based on SIC code descriptions) | medium | 12 |
| Dun and Bradstreet (First order of SIC codes) (Assessed based on SIC code descriptions) | low | 11 |
| Dun and Bradstreet (Second order of SIC codes) (Assessed based on SIC code descriptions) | low | 12 |
| EPA's Permit Compliance System | low | 18 |
| **Potential Transfer Facilities** | | |
| 1993 Inland River Guide | high | 14 |
| Modern Bulk Transporter, December 1992, Bulk Transfer Directory | high | 6 |
| Dun and Bradstreet (First order of SIC codes) (Assessed based on SIC code descriptions) | medium | 11 |
| Dun and Bradstreet (Second order of SIC codes) (Assessed based on SIC code descriptions) | medium | 12 |
| Dun and Bradstreet (First order of SIC codes) (Assessed based on SIC code descriptions) | low | 11 |
| Dun and Bradstreet (Second order of SIC codes) (Assessed based on SIC code descriptions) | low | 12 |
| EPA's Permit Compliance System | low | 18 |
| **Potential Tank Truck Cleaning Facilities** | | |
| Telephone Contacts (All sources) | high | All |
| Modern Bulk Transporter, March 1993, Tank Cleaners Directory | high | 4 |
| Modern Bulk Transporter, February 1993, Tank Trailer Repair Directory | high | 5 |
| Modern Bulk Transporter, December 1992, Tank Container Depot Directory | high | 6 |
| Modern Bulk Transporter, March 1992, Tank Cleaners Directory | high | 7 |
| Modern Bulk Transporter, January 1992, Advertisement | high | 8 |
| Modern Bulk Transporter, September 1992, Advertisement | high | 9 |
| City of Houston Industrial Wastewater Service List | high | 26 |
| Metropolitan Water Reclamation District of Chicago List | high | 25 |
| 1993 Industrial and Hazardous Waste Transporters | medium | 13 |

## Table 3-2 (Continued)

| Source | Level of Assurance | Source Code |
|---|---|---|
| 1993 National Motor Carriers Directory | medium | 17 |
| TRINC Owners File | medium | 22 |
| TRINC Users File (Facilities operate tank trucks) | medium | 23 |
| Alabama Department of Environmental Management List<br>Mississippi Permitted Facilities | medium | 3 |
| Kentucky Department for Environmental Protection List | medium | 15 |
| Dun and Bradstreet (Second order of SIC codes) (Assessed by SIC code descriptions) | medium | 12 |
| Dun and Bradstreet (First order of SIC codes) (Assessed by SIC code descriptions) | medium | 11 |
| 1993 Private Fleet Directory | low | 2 |
| TRINC Users File (Assessed by SIC code descriptions) | low | 23 |
| Dun and Bradstreet (Second order of SIC codes) (Assessed by SIC code descriptions) | low | 12 |
| Dun and Bradstreet (First order of SIC codes) (Assessed by SIC code descriptions) | low | 11 |
| EPA's Permit Compliance System | low | 18 |

# Table 3-3

## Original Screener Questionnaire Sample Frame and Distribution of Facilities in the TECI Screener Questionnaire Mailing List by Facility Type and Level of Assurance

| Level of Assurance (Probability of Performing TEC Operations) | Facility Type | | | | | Total Facilities |
|---|---|---|---|---|---|---|
| | Aircraft Segment (a) | Rail Tank Car Cleaning | Tank Barge Cleaning | Tank Truck Cleaning | Transfer Facilities | |
| High | 266 | 157 | 78 | 604 | 106 | **1,211** |
| Medium | 487 | 218 | 357 | 433 | 9 | **1,504** |
| Low | 7 | 30 | 114 | 1,133 | 1 | **1,285** |
| **TOTAL Facilities** | **760** | **405** | **549** | **2,170** | **116** | **4,000** |

(a) The Agency has postponed consideration of developing effluent limitations guidelines and standards for the aircraft segment. Data for the aircraft segment are included only to describe the statistical sampling performed to develop the TECI site identification database and the TECI screener mailing list.

# Table 3-4

## Summary of TECI Screener Questionnaire Mail-Out and Follow-Up Activities

| Activity | Number of Facilities |
|---|---|
| Screeners mailed | 3,269 |
| Screeners remailed | 184 |
| Screeners returned undelivered | 244 |
| Follow-up letters mailed | 450 |
| Follow-up phone calls completed | 755 |
| Number of dry facilities | 26 |
| Screener responses received | 2,963 |
| In-scope responses | 754 |
| Helpline calls | 698 |
| Inactive facilities | 268 |
| Screeners unaccounted for | 60 |

# Table 3-5

## Final Screener Questionnaire Sample Frame Strata and Total Population Estimates

| Screener Questionnaire Strata | Screener Questionnaire Strata Code (Source) (a) | Number of In-Scope Screener Responses | Survey Weighting Factor | Estimated Total Number of Facilities in TECI |
|---|---|---|---|---|
| 1 | Census (multiple) | 509 | 1.049 | 533.94 |
| 2 | Barge-Low (1,12) | 1 | 7.400 | 7.40 |
| 3 | Truck-Low (2) | 38 | 10.619 | 403.51 |
| 4 | Transfer-Low (11,12,18) | 1 | 9.500 | 9.50 |
| 5 | Truck-Low (12) | 11 | 8.762 | 96.38 |
| 6 | Truck-Medium (12) | 13 | 8.532 | 110.91 |
| 7 | Truck-Medium (13); Non-Census | 15 | 6.308 | 94.62 |
| 8 | Truck-Medium (17) | 23 | 8.033 | 184.77 |
| 9 | Rail-High (19) | 63 | 2.093 | 131.86 |
| 10 | Truck-Medium (22) | 7 | 3.074 | 21.52 |
| 11 | Truck-Low (23) | 25 | 33.749 | 843.73 |
| 12 | Truck-Medium (23) | 17 | 17.272 | 293.62 |
| 13 | Truck-Medium (13); Census | 7 | 1.00 | 7.00 |
| **TOTAL** | | | | **2,738.76** |

(a) Source code listed in Table 3-2.

# Table 3-6

## Detailed Questionnaire Sample Frame and Distribution of Facilities in the TECI Detailed Questionnaire Mailing List by Strata

| Detailed Questionnaire Strata | Detailed Questionnaire Strata Code (Source) (a) | Number of Facilities Selected for Detailed Questionnaire Mailing List |
|---|---|---|
| 1 | Census - Barge; Census | 4 |
| 2 | Census - Barge; Random | 16 |
| 3 | Census - Land-Water; Census | 9 |
| 4 | Census - Rail; Census | 9 |
| 5 | Census - Rail; Random | 11 |
| 6 | Census - Truck-Land; Census | 3 |
| 7 | Census - Truck-Land; Random | 75 |
| 8 | Census - Tanker-Water; Census | 6 |
| 9 | Barge-Low (1,12); Nonshipper | 1 |
| 10 | Truck-Low (2); Nonshipper | 8 |
| 11 | Truck-Low (2); Shipper | 12 |
| 12 | Transfer-Low (11,12,18); Nonshipper | 1 |
| 13 | Truck-Low (12); Nonshipper | 11 |
| 14 | Truck-Medium (12); Nonshipper | 12 |
| 15 | Truck-Medium (13); Nonshipper; Random | 15 |
| 16 | Truck-Medium (13); Nonshipper; Census | 7 |
| 17 | Truck-Medium (17); Nonshipper | 22 |
| 18 | Rail-High (19); Nonshipper | 18 |
| 19 | Rail-High (19); Shipper | 8 |
| 20 | Rail-High (19); Shipper; Land-Water | 3 |
| 21 | Truck-Medium (22); Nonshipper | 7 |
| 22 | Truck-Low (23); Shipper | 10 |
| 23 | Truck-Medium (23); Shipper | 7 |
| **TOTAL** | | **275** |

(a) Source code listed in Table 3-2.

# Table 3-7

## Summary of TECI Detailed Questionnaire Mail-Out and Follow-Up Activities

| Activity | Number of Facilities |
|---|---|
| Detailed Questionnaires Mailed | 287 |
| Reminder Phone Calls | 156 |
| Delinquent Response Phone Calls or Letters | 75 |
| Questionnaire Responses Received<br>— Part A<br>— Part B | <br>200<br>195 |
| Responses Received, Insufficient for Analyses<br>— Part A<br>— Part B | <br>1<br>5 |
| Out-of-Scope Responses | 40 (3 Dry Facilities) |
| Helpline Calls<br>— Part A<br>— Part B | <br>192 (477 Total Calls)<br>(161 Total Calls) |
| Follow-up Calls During Questionnaire Review<br>— Part A<br>— Part B | <br>171<br>142 |

# Table 3-8

## Detailed Questionnaire Sample Frame Strata and Weights

| Detailed Questionnaire Strata | Detailed Questionnaire Strata Code (Source) (a) | Survey Weighting Factor |
|---|---|---|
| 1 | Census - Barge; Census | 1.31 |
| 2 | Census - Barge; Random | 2.10 |
| 3 | Census - Land-Water; Census | 1.05 |
| 4 | Census - Rail; Census | 1.05 |
| 5 | Census - Rail; Random | 4.86 |
| 6 | Census - Truck-Land; Census | 1.05 |
| 7 | Census - Truck-Land; Random | 5.37 |
| 8 | Census - Tanker-Water; Census | 1.05 |
| 9 | Barge-Low (1,12); Nonshipper | 7.40 |
| 10 | Truck-Low (2); Nonshipper | 10.62 |
| 11 | Truck-Low (2); Shipper | 25.66 |
| 12 | Transfer-Low (11,12,18); Nonshipper | 9.50 |
| 13 | Truck-Low (12); Nonshipper | 8.76 |
| 14 | Truck-Medium (12); Nonshipper | 8.53 |
| 15 | Truck-Medium (13); Nonshipper; Random | 6.31 |
| 16 | Truck-Medium (13); Nonshipper; Census | 1.00 |
| 17 | Truck-Medium (17); Nonshipper | 8.03 |
| 18 | Rail-High (19); Nonshipper | 2.09 |
| 19 | Rail-High (19); Shipper | 10.20 |
| 20 | Rail-High (19); Shipper; Land-Water | 2.09 |
| 21 | Truck-Medium (22); Nonshipper | 3.07 |
| 22 | Truck-Low (23); Shipper | 84.37 |
| 23 | Truck-Medium (23); Shipper | 41.95 |

# 4.0 INDUSTRY DESCRIPTION

The Transportation Equipment Cleaning Industry (TECI) includes facilities that use water to clean the interiors of tank trucks, closed-top hopper trucks, intermodal tank containers, rail tank cars, closed-top hopper rail cars, inland tank barges, closed-top hopper barges, ocean/sea tankers, and other similar tanks (excluding intermediate bulk containers (IBCs) and drums). This section describes and provides a profile of the TECI. Information presented in this section is based on data provided by facilities in response to the Detailed Questionnaire (1) and obtained by EPA's site visit and sampling programs. The Detailed Questionnaire database (2) includes information necessary to develop an industry profile, characterize transportation equipment cleaning (TEC) processes, and perform an industry subcategorization analysis. Note that the data contained in the Detailed Questionnaire database reflect TECI operations in calendar year 1994.

Information presented in this section is based on operations performed by the estimated total TECI population of 1,229[1] facilities. This total includes an estimated 692 discharging facilities and 537[1] zero discharge facilities.

## 4.1 Operational Structure

The TECI is characterized by four business operational segments: independents, carriers, shippers, and builder/leasers. Independent facilities provide commercial cleaning services, either as a primary or secondary business, for tanks that they do not own or operate. Carrier-operated facilities, or "for-hire facilities", own, operate, and clean tank fleets used to transport cargos for other companies. Shipper-operated facilities transport their own cargos or engage carriers to transport their cargos, and clean the fleets used for such transport. Builder/ leaser facilities manufacture and/or lease tanks, and clean the interiors of these tanks after

[1] Does not include an additional estimated 10 facilities represented by a single nonrespondent.

equipment has been placed in service. Since transportation facilities may perform a variety of business operations, TEC facilities may be classified under more than one operational segments.

The TECI is additionally classified based on the relationship between the cleaning facility and the customer: commercial and in-house. The first category, commercial facilities, includes independent tank wash facilities and builder/leaser-operated facilities, at which customers pay a fee for tank cleaning. The second category comprises shipper-operated or carrier-operated facilities that provide tank cleaning facilities to support in-house operations. These facilities are considered private because tank cleaning services may not be offered to nonaffiliated transportation equipment.

Approximately two-thirds of the TECI are shipper-operated or carrier-operated facilities that provide tank cleaning services to support in-house operations. Tank trucks and rail tank cars that last transported food grade products are most likely to be cleaned by in-house facilities because these tanks usually transport the same cargos for the same food processing facility and because quality control measures are more stringent for cleaning food-grade tanks. In contrast, tank and hopper barges are typically cleaned by independent tank wash facilities located on their travel routes, because these carriers usually transport cargos in both directions to maximize their large capacities and minimize the effects of the slower travel.

## 4.2 Cleaning Purpose

Tank and container interiors are cleaned for two primary purposes: (1) to prevent contamination of materials from one cargo shipment to the next and (2) to facilitate inspection and repair. Facility responses to the Detailed Questionnaire indicate that tanks are used to transport more than 700 unique cargos. Tanks that are not in dedicated service (i.e., tanks that carry a variety of products) are generally cleaned before each product changeover to prevent contamination of the new cargo. Some tanks in dedicated service also require cleaning to prevent contamination of subsequent cargos if product purity is a concern, such as for certain process chemicals and food products, including milk, vegetable oils, molasses, and corn syrup. Sections 4.4 and 4.5 discuss in detail the tank types and cargo types cleaned, respectively.

Tank interiors are also cleaned to facilitate internal inspection of the tank and/or inspection of fittings and valves that may be required as part of a routine inspection and maintenance program. In addition, the interior of the tank must be rendered nonexplosive and nonflammable through a cleaning process called “gas-freeing” to provide a safe environment for manual cleaning and for tank repairs that require “hot work” (e.g., welding or cutting).

## 4.3 TEC Operations

Although different types of tanks are cleaned in various manners, the basic cleaning process for each tank is similar. A typical sequence is as follows:

- Review shipping manifest forms to determine the cargo last transported in the tank;
- Determine the next cargo to be transported in the tank;
- Drain the tank heel (residual product) and, if necessary, segregate the heel for off-site disposal;
- Rinse the tank with water;
- Wash the tank using one or more cleaning methods and solutions;
- Rinse the tank with water; and
- Dry the tank.

Figure 4-1 illustrates the general TEC processes performed. The following paragraphs further describe these processes.

The cleaning facility determines the cargo last transported in the tank to: (1) assess the facility's ability to clean the tank efficiently; (2) determine the appropriate cleaning sequence and cleaning solutions; (3) evaluate whether the residue cleaned from the tank will be compatible with the facility's wastewater treatment system; and (4) establish an appropriate level of health and safety protection for the employees who will clean the tank.  The next cargo to be transported in the tank is identified to determine if the available level of cleaning at the facility is adequate to prevent contamination of the next cargo.  The facility may decide to reject a tank based on any of the preceding concerns.

Once a tank has been accepted for cleaning, the facility checks the volume of heel (residual cargo) in the tank and determines an appropriate heel disposal method.  Any water-soluble heels that are compatible with the facility's treatment system and the conditions of the facility's wastewater discharge permit are usually combined with other wastewaters for treatment and discharge at the facility.  Incompatible heels are segregated into drums or tanks for disposal or reuse by alternative means, which may include reuse on site, return to the consignee, sale to a reclamation facility, landfilling, or incineration.  The TEC facility may reuse heels comprising soaps, detergents, solvents, acids, or alkalis as tank cleaning solutions or as neutralizers for future heels and for wastewater treatment.  Section 4.6 discusses heel removal and disposal in detail.

Cleaning processes vary among facilities depending on available cleaning equipment and the cargos last transported in the tanks to be cleaned.  Certain residual materials (such as sugar) only require a water rinse, while other residual materials (such as latexes or resins) require a detergent or strong caustic solution followed by a final water rinse.  Other cleaning processes include presolve (application of solvent or diesel to the tank interior for cargos that are difficult to remove), steam cleaning, and forced air drying.  The state of the product last transported in the tank affects the cleaning processes used.  For example, hardened or caked-on products sometimes require an extended processing time.  Some tanks require manual cleaning with scouring pads, shovels, or razor blades to remove residual materials.  The cleaning of tanks used to transport gases or volatile material sometimes requires filling the tank to capacity with water to displace vapors, followed by flushing of the wastewater. Section 4.7 discusses chemical cleaning solutions in detail.

Tanks are typically washed using one of two methods: (1) low- or high-pressure spinner nozzles or (2) hand-held wands and nozzles. Spinner nozzles, which are inserted through the main tank hatch, operate at pressures between 100 pounds per square inch (psi) and 600 psi to deliver hot or cold water rinses and a variety of cleaning solutions. They are designed to rotate around both their vertical and horizontal axes to create an overlapping spray pattern that cleans the entire interior of the tank. Operating cycles range from rinse bursts of a few seconds to recirculating detergent or caustic washes of 20 minutes or longer for caked or crystallized residues. Washing with hand-held wands and nozzles achieves the same result as with high-pressure spinner nozzles, but requires facility personnel to manually direct the wash solution across the interior surface of the tank.

After cleaning, tanks may be dried by applying ambient or heated air using a blower. Cleaning personnel may enter and inspect tank interiors and perform manual cleaning as required. Valves, fittings, and other tank components may be removed and cleaned by hand. Hoses are generally cleaned in a separate hose bath using the same cleaning solutions as those used to clean tank interiors.

### 4.3.1 Tank and Hopper Truck, IBC, and Intermodal Tank Container Cleaning

Tank trucks, IBCs, and intermodal tank containers are generally considered empty when they arrive at the facility, but may contain between one quart and twenty gallons of heel (typically less than 1% of tank capacity). Closed-top hopper trucks generally contain less than five pounds of residual material. Tank interior cleaning is typically performed in wash racks (or cleaning bays), but may also be performed in designated wash areas that are not constructed specifically for tank interior cleaning. Tank exterior cleaning is often performed in the same wash racks with the wastewater commingled with tank interior cleaning wastewater. Facilities may have separate, dedicated cleaning bays, cleaning solutions, and equipment for cleaning tanks that previously contained chemical and food grade cargos. On average, tank and hopper truck, IBC, or intermodal tank container cleaning requires two hours: one-half hour for equipment handling (i.e., moving the tank in and out of the cleaning bay and preparation for cleaning), and one and one-half hours for cleaning, which includes visual inspection and any manual cleaning.

### 4.3.2 Rail Tank and Hopper Car Cleaning

Rail tank cars are generally considered empty when they arrive at the facility, but cars typically contain approximately 60 gallons of heel (typically less than 1% of tank capacity). Rail hopper cars may contain approximately 100 gallons of heel. Rail tank and hopper car cleaning processes are similar to the processes used for tank and hopper truck cleaning described above; however, rail cars are more likely to be cleaned using steam rather than caustic or detergent cleaning solutions. Rail car exteriors are less likely to be cleaned. Of particular concern during rail tank car cleaning is the potential to damage the interior tank lining, which is designed to protect the tank wall from corrosion by the tank contents.

### 4.3.3 Tank and Hopper Barge and Ocean/Sea Tanker Cleaning

Tank barges are generally considered empty when they arrive at the facility, but typically contain approximately 1,000 gallons of heel (typically less than 1% of tank capacity). Tank barge cleaning facilities typically perform six basic operations: strip liquid free, strip and blow, clean for a Marine Chemist's Certificate, cold water manual wash, cold water Butterworth® (low-pressure, high-volume spinner) wash, and hot water Butterworth® wash. Depending on the specifications of the cleaning request, any one of these operations is performed or repeated, and cleaning solutions may be used. The most common cleaning operation involves heel stripping followed by a Butterworth® wash and rinse. Heel, wash, and rinse waters are removed from the tanks using vacuum pumps. The barge is then certified for entry by a Marine Chemist and facility personnel enter the tanks to inspect the interior. If necessary, a manual wash is performed. Cleaning time for tank barges typically ranges from four to eight hours.

Hopper barges require more manual cleaning than tank barges because of the dense nature of the dry bulk cargos last transported. Hopper barges have covers that are easily removed by a crane to facilitate tank entry by personnel and equipment and eliminate confined-space entry concerns. Typically, a skid loader (e.g., Bobcat®) is lowered by crane into the barge and collects the heel into a large container. The skid loader and container are then removed and personnel manually wash the inside of the barge using a high-pressure, high-volume fire hose. Wash water is continually stripped from the barge using a vacuum pump. The barge may then be inspected by a grain inspector.

The cleaning operations performed for ocean/sea tankers are similar to those of tank barges, although larger in scale. Cargo hold interiors are predominantly cleaned at sea by the tanker crew, with wastewater either discharged shore side at ballast water treatment facilities or at sea within the provisions of the International Convention for the Prevention of Pollution by Ships (MARPOL). A relatively small percentage of cargo hold interiors are cleaned shore side to facilitate inspection and repair and are performed concurrently with ballast tank and bunker (fuel) tank cleanings.

### 4.3.4 Special Cleaning Processes

Tanks (particularly tank trucks) that last contained food grade products such as corn and sugar sweeteners, juice, and chocolate are typically cleaned using a computer operated and controlled washing system, which regulates the cleaning equipment for each step in the selected cleaning sequence, including flow rate, pressure, temperature, and cleaning sequence duration. The cleaning process is performed in dedicated food grade cleaning bays equipped with stainless steel cleaning equipment. A hot water wash is performed according to standards adopted by the Coca-Cola Company©, which require certification that each tank has been washed and sanitized at a temperature of at least 180°F for a minimum of 15 minutes as measured by the temperature of the wash water exiting the tank. The system includes a temperature chart to continuously record the temperature of the recirculating wash water and generates a cleaning ticket for each tank certifying that the temperature and time requirements have been met. The specification requires tank recleaning if not loaded within 24 hours of certification.

## 4.4 Tank Types Cleaned

Facilities responding to the TECI Detailed Questionnaire reported cleaning nine primary tank types. These nine tank types can be subdivided into a total of 34 tank classifications by tank capacity; however, only the primary tank type classifications were considered for this discussion. The table below lists each of the nine primary tank types and number cleaned. A definition of these tank types is located in the glossary in Section 15.0.

| Tank Type | Number of Cleanings | Percentage of Total Number of Tank Cleanings (%) |
|---|---|---|
| Tank Truck (T) | 2,110,000 | 87 |
| Intermediate Bulk Container (IBC) | 84,500 | 3 |
| Intermodal Tank Container (IM) | 81,500 | 3 |
| Closed-Top Hopper Truck (TH) | 65,500 | 3 |
| Rail Tank Car (R) | 49,700 | 2 |
| Ocean/Sea Tanker (NT) | 14,800 | <1 |
| Closed-Top Hopper Barge (BH) | 12,600 | <1 |
| Closed-Top Hopper Rail Car (RH) | 8,990 | <1 |
| Inland Tank Barge (B) | 8,960 | <1 |
| **TOTAL** (a) | **2,440,000** | **100** |

(a) Differences occur due to rounding.

The majority of facilities in the TECI reported cleaning only one primary tank type; however, a total of twenty tank types and combinations of tank types were reported to be cleaned by facilities in the TECI. The distribution of tank types cleaned is summarized below.

| Facility Group | Total Number of Facilities in Group | Percentage of Total Facilities in the TECI (%) |
|---|---|---|
| Facilities that clean only one primary tank type (e.g., T only, R only) | 913 | 74 |
| Facilities that clean both tanks and closed-top hoppers within the same mode of transport only (e.g., T and TH, R and RH) | 142 | 12 |
| Facilities that clean tank types with multiple modes of transport (e.g., T and R, R and B) | 13 | 1 |
| Facilities that clean miscellaneous combinations of tank types (i.e., no apparent tank type trends) | 160 | 13 |
| **TOTAL** (a) | **1,229** | **100** |

(a) Differences occur due to rounding.

This distribution demonstrates that the TECI is mostly characterized by facilities that clean only one primary tank type. Of the 913 facilities that clean only one primary tank type, 73% clean only tank trucks and 11% clean only rail tank cars. The remaining 16% of facilities clean, in descending order by percentage of facilities, intermediate bulk containers, closed-top hopper trucks, tank barges, closed-top hopper barges, and ocean/sea tankers. This distribution corresponds closely to the total number of each type of tank cleaned. The Agency did not identify any facilities that clean only either intermodal tank containers or closed-top hopper rail cars.

For facilities that clean both tanks and closed-top hoppers within the same mode of transport (e.g., T and TH, R and RH, or B and BH), the percentage of tank cleanings performed versus hopper cleanings performed was estimated. At 94% of the facilities that clean both tank trucks and closed-top hopper trucks, tank truck cleanings account for at least 75% of all cleanings performed. For the remaining 6% of facilities, hopper truck cleanings account for more than 99% of all cleanings performed. At 91% of facilities that clean both rail tank cars and closed-top rail hopper cars, rail tank car cleanings typically account for greater than 60% of all cleanings performed. For the remaining 9% of facilities, rail hopper car cleanings account for nearly 86% of all cleanings performed. For facilities that clean both tank barges and closed-top hopper barges, tank barge cleanings comprise less than 1% of all cleanings performed. These distributions suggest that facilities that clean both tanks and closed-top hoppers typically clean either predominantly tanks or predominantly closed-top hoppers.

Only 1% of the TECI consists of facilities that clean tank types within multiple modes of transportation and 13% cleans combinations of tank types. Of the 13%, all of these facilities clean tank trucks and some combination of intermediate bulk containers and/or intermodal tank containers. Some of these facilities also clean a relatively small percentage of closed-top hopper trucks.

## 4.5 Cargo Types Cleaned

Facilities responding to the TECI detailed questionnaire reported cleaning 15 general cargo types listed below. Appendix A of the Detailed Questionnaire contains a more detailed description of these cargo types.

- Group A - Food Grade Products, Beverages, and Animal and Vegetable Oils;
- Group B - Petroleum and Coal Products;
- Group C - Latex, Rubber, and Resins;
- Group D - Soaps and Detergent;
- Group E - Biodegradable Organic Chemicals;
- Group F - Refractory (Nonbiodegradable) Organic Chemicals;
- Group G - Inorganic Chemicals;
- Group H - Agricultural Chemicals and Fertilizers;

- Group I - Chemical Products;
- Group J - Hazardous Waste (as defined by RCRA in 40 CFR Part 261);
- Group K - Nonhazardous Waste;
- Group L - Dry Bulk Cargos; and
- Group M, N, and O - Other (Not Elsewhere Classified).

Figure 4-2 illustrates the distribution of TEC facilities by the number of cargo types cleaned. As demonstrated by this distribution, the TECI is characterized by facilities that clean either a single cargo type (48%) or a variety of cargo types (52%).

The distribution of the facilities that clean a single cargo type is presented in Table 4-1. Of the facilities that reported cleaning only one cargo type, 81% clean either food grade products, beverages, and animal and vegetable oils (65%) or petroleum and coal products (16%). Facilities that reported cleaning only "other" cargos (Groups M, N, and O) comprise 10% of facilities that clean a single cargo type. Over half of these facilities that clean only "other" cargos clean tanks that last contained drilling mud, drilling fluids, salt water, or frac-sand mix from oil well drilling operations.

A cursory review of the facilities that clean two or more cargo types suggests no apparent trends of cargo types cleaned, but rather a wide variety of combinations of "chemical-type" cargos.

## 4.6 Heel Removal and Disposal

As noted in Section 4.3, heel is residual cargo remaining in a tank or container following unloading, delivery, or discharge of the transported cargo. The amount of heel removed per tank cleaning depends primarily on the type of tank being cleaned. Other significant factors that impact residual heel volume include cargo viscosity, tank internal construction, tank offloading system design, and consignee tank offloading system design. Table 4-2 provides a detailed analysis of the average volume of heel removed per tank cleaning by cargo group and tank type. (Note that ocean/sea tankers are not included in this analysis because that group of tankers is represented by only one Detailed Questionnaire response and because the facility that responded reported that no heel was removed from tanks cleaned). As shown in the table, tank barges contain the largest amount of heel of all the tank types due to their large capacities. On average, tank trucks, intermediate bulk containers, and intermodal tank containers contain less than 10 gallons of heel and rail cars contain approximately 60 gallons of heel.

Listed below are the 10 discharge or disposal methods for heels reported in responses to the Detailed Questionnaire:

- Discharged with tank cleaning wastewater (WW);
- Discharged or hauled separately from tank cleaning wastewater to a treatment works (ID);
- Evaporation (EV);
- On-site or off-site land disposal (LD);
- On-site or off-site land application (LA);
- On-site or off-site incineration (IN);
- On-site or off-site heat recovery (HR);
- On-site or off-site reuse or recycle (RR);
- Deep well injection (DW); and
- Discharged or hauled separately from tank cleaning wastewater to a hazardous waste treatment, storage, and disposal facility (HD).

Table 4-3 provides a distribution of the total volume of heel discharged or disposed in 1994 by cargo group and by discharge/disposal method. As shown in the table, the largest volume of heel (58%) is reused or recycled on or off site. The largest percentage of reused or recycled heel consists of food grade products, petroleum and coal products, organic and inorganic chemicals, and chemical products. Food grade products heel is often reused as animal feed; petroleum and coal products heel is typically sold for product recovery. The second largest volume of heel (15%) is land disposed; petroleum and coal products heel and dry bulk cargos heel comprise 82% of heel that is land disposed.

Twelve percent of the total heel removed by the TECI is discharged with tank interior cleaning wastewater and comprises primarily inorganic chemical products, food grade products, and latex, rubber, and resin heels. Land application, deep well injection, and incineration are used to dispose less than 2% of the total volume of heel removed.

Many facilities implement measures to reduce the amount of heel received. Of the 1,229 facilities in the TECI, 589 facilities (48% of the population) reported practicing one or more heel minimization measures. The most commonly practiced of these measures is to refuse or reject tanks for cleaning if excessive heel is present. Some facilities charge an extra fee per weight or volume of heel received as an incentive to tank owners to minimize heel. Most TEC facilities maintain good communications with their customers, and drivers are instructed to inspect all tanks to ensure complete product offloading and to eliminate the need to reject tanks for cleaning or to assess extra fees.

## 4.7 Chemical Cleaning Solutions

As noted in Section 4.3, many cargo types require the use of chemical cleaning solutions in the tank cleaning process. Responses to the Detailed Questionnaire indicate that facilities typically use four types of chemical cleaning solutions: (1) acid solution; (2) caustic solution; (3) detergent solution; and (4) presolve solution. Acid solutions most commonly used by TEC facilities are composed of hydrofluoric and/or phosphoric acid and water. In addition to tank interior cleaning, these acid solutions are used as metal brighteners on aluminum and stainless steel tank exteriors. Caustic solutions typically comprise a mixture of sodium hydroxide and water in different proportions. The most common ingredients in detergent solutions are sodium metasilicate and phosphate-based surfactants. Some facilities use off-the-shelf brands of detergent solutions such as Tide®, Arm & Hammer®, and Pine Power®. Often, concentrated detergents ("boosters") such as glycol ethers or esters are added to acid and caustic solutions to improve their effectiveness. Presolve solutions usually consist of diesel fuel, kerosene, or some other petroleum-based solvent. Other miscellaneous chemical cleaning solutions include passivation agents (oxidation inhibitors), odor controllers such as citrus oils, and sanitizers; these solutions are usually applied on a cargo-specific or tank-specific basis. Responses to the Detailed Questionnaire indicate no obvious trends between the chemical cleaning solutions used and the cargo types cleaned (i.e., each chemical cleaning solution category is reported as being used to clean each cargo type noted in Section 4.5). The choice of chemical cleaning solutions used is more likely a factor of wastewater treatment system compatibility, POTW limitations, facility preference, and/or customer preference.

Of the 1,229 facilities in the TECI, 656 (53% of the population) reported using one or more chemical cleaning solutions. The following table shows the number of facilities that reported using each chemical cleaning solution.

| Chemical Cleaning Solution | Number of Facilities That Use Each Chemical Cleaning Solution | Percentage of All Facilities That Use Chemical Cleaning Solutions (%) |
|---|---|---|
| Acid Solution | 50 | 8 |
| Caustic Solution | 434 | 66 |
| Detergent Solution | 560 | 85 |
| Presolve Solution | 137 | 21 |
| Other Chemical Cleaning Solution | 134 | 20 |

As shown in the table, detergent solution is the most commonly used cleaning solution, used by 85% of all facilities that use chemical cleaning solutions. The second most commonly used chemical cleaning solution is caustic solution, which is used by 66% of all facilities that use chemical cleaning solutions. Acid solution is used by only 8% of all facilities that use chemical cleaning solutions.

Chemical cleaning solutions are generally reused until they are no longer effective, as determined by cleaning personnel. Make-up solution is periodically added to replace solution lost in the final rinse or to boost efficacy. Spent cleaning solutions may be hauled off site for disposal or discharged to the on-site wastewater treatment system, if compatible. Of the 656 facilities that reported using chemical cleaning solutions, 84% discharge one or more cleaning solutions to their on-site wastewater treatment systems, 59% of these facilities reuse their cleaning solutions before discharge to wastewater treatment, and 16 % send their cleaning solutions off site.

## 4.8 Non-TEC Operations

In addition to tank interior cleaning, TEC facilities often perform other operations that may generate wastewater. Some of these operations support transportation equipment operations such as tank exterior cleaning, tank hydrostatic testing, and tank repair and maintenance. Other facilities perform processing or manufacturing operations as their primary business and use transportation equipment as a component of their primary business. The following table shows the number of facilities that generate wastewater from each of the non-TEC operations noted above.

| Non-TEC Operation | Number of Facilities | Percentage of Total Population (%) | Total Wastewater Generation (gallons per day) |
|---|---|---|---|
| Tank Exterior Cleaning | 735 | 60 | 1,050,000 |
| Processing and Manufacturing | 368 | 30 | 62,400,000 |
| Tank Hydrotesting | 197 | 16 | 900,000 |
| Tank Repair and Maintenance | 94 | 7 | 6,920 |

Approximately 60% of facilities generate wastewater from tank exterior cleaning activities. Tank exterior cleaning is usually performed at the same wash rack as tank interior cleaning; therefore, nearly all tank exterior cleaning wastewater is commingled with TEC interior cleaning wastewater prior to treatment. Exterior cleaning wastewater may be contaminated by wastes from a variety of sources, including the cargos last transported in the tank, spent cleaning solutions, exterior surface dirt, soot from engine exhaust, metals from the tank components (including rust), and engine fluids (including fuel, hydraulic fluid, and oil).

Processing and manufacturing operations are performed at nearly one third of facilities and generate relatively large volumes of wastewater. These wastewaters are usually treated and/or discharged together with tank interior cleaning wastewater due to their similar composition.

Tank hydrotesting (i.e., hydrostatic pressure testing), a DOT requirement, is performed to determine the integrity of a tank and is a component of routine tank inspection. Since tanks are usually cleaned before hydrotesting, hydrotesting wastewater contains minimal contaminants and is easily reused or recycled.

Only 7% of facilities in the TECI reported generating wastewater from repair and maintenance activities.

## 4.9 Geographic Profile

EPA performed a geographical mapping analysis of the Detailed Questionnaire sample population of 142 facilities (discharging facilities plus zero discharge facilities). Note that a simple geographical mapping of these facilities may not accurately represent the TECI because each facility in the sample population has a unique statistical survey weight, ranging from 1.0489 to 87.6106, which is not reflected in the maps. The mapping analysis, however, may be appropriate to identify geographic trends within the TECI. Figures 4-3 through 4-9 illustrate the following facility geographic distributions:

- Figure 4-3: All Facilities;
- Figure 4-4: Truck Facilities;
- Figure 4-5: Rail Facilities;
- Figure 4-6: Barge Facilities;
- Figure 4-7: Chemical Facilities;

- Figure 4-8: Food Grade Facilities; and
- Figure 4-9: Petroleum Facilities.

As illustrated in Figure 4-3, TEC facilities are distributed primarily within the industrial portions of the United States, with relatively high concentrations in the area between Houston and New Orleans and within specific urban areas such as Los Angeles, Chicago, and St. Louis. The distribution of truck facilities illustrated in Figure 4-4 mirrors the distribution of all facilities illustrated in Figure 4-3. The distribution of rail facilities (illustrated in Figure 4-5) shows lower concentrations in the area between Houston and New Orleans and higher concentrations across eastern Texas as compared to Figure 4-3. As illustrated in Figure 4-6, barge facilities are located along inland waterways of the United States (note the location of an ocean/sea tanker cleaning facility in Florida). Presumably, differences among the geographical distributions illustrated in Figures 4-4 through 4-6 indicate major thoroughfares by road, rail, and inland waterway, respectively.

The distribution of chemical facilities illustrated in Figure 4-7 resembles the distribution of all facilities illustrated in Figure 4-3 except for a relatively lower concentration of facilities in the northwestern region of the United States. As illustrated in Figure 4-8, food grade facilities are specifically not located within the area between Houston and New Orleans, and appear to be located primarily within agricultural areas of the United States. The distribution of petroleum facilities does not include a concentration of facilities within the area between Houston and New Orleans, an area typically associated with the petroleum industry. A possible explanation is that petroleum tanks are loaded in the Houston/New Orleans area for transport to other regions of the United States; the tanks may then be cleaned in the local area of the consignee. Another possible explanation is that pipelines rather than tanks are the primary mode of petroleum product transportation in this area.

## 4.10 References[1]


1. U.S. Environmental Protection Agency. Information Collection Request, 1994 Detailed Questionnaire for the Transportation Equipment Cleaning Industry. November 1994 (DCN T09843).

2. Eastern Research Group, Inc. Data Element Dictionary for Part A of the U.S. Environmental Protection Agency 1994 Detailed Questionnaire for the Transportation Equipment Cleaning Industry Database. April 4, 1997 (DCN T10271).


[1] For those references included in the administrative record supporting the proposed TECI rulemaking, the document control number (DCN) is included in parentheses at the end of the reference.

# Table 4-1

## Distribution of Facilities That Clean a Single Cargo Type – Discharging and Zero Discharge Facilities

| Cargo Type Cleaned | Number of Facilities | Percentage of Facilities That Clean Only This Cargo Type (%) |
|---|---|---|
| Food Grade Products, Beverages, and Animal and Vegetable Oils (A) | 385 | 65 |
| Petroleum and Coal Products (B) | 96 | 16 |
| Latex, Rubber, and Resins (C) | (a) | (a) |
| Soaps and Detergents (D) | NC | NC |
| Biodegradable Organic Chemicals (E) | NC | NC |
| Refractory (Nonbiodegradable) Organic Chemicals (F) | NC | NC |
| Inorganic Chemicals (G) | 11 | 2 |
| Agricultural Chemicals and Fertilizers (H) | 20 | 3 |
| Chemical Products (I) | NC | NC |
| Hazardous Waste (J) | NC | NC |
| Nonhazardous Waste (K) | NC | NC |
| Dry Bulk Cargos (L) | 22 | 4 |
| Other (M, N, or O) | 60 | 10 |
| **TOTAL** (b) | **596** | **100** |

(a) The data in this cell represents three or fewer facilities and therefore is not shown here due to confidential business information and/or other data disclosure considerations.
(b) Differences due to rounding.
NC **-** Facilities with this characteristic were not identified by responses to the Detailed Questionnaire.  Therefore, data for these facilities, if facilities with these characteristics do indeed exist, are not available for this analysis.

# Table 4-2

## Average Volume of Heel Removed per Tank Cleaning by Cargo Group and Tank Type – Discharging and Zero Discharge Facilities

| Cargo Group | Tank Type (gallons of heel/tank) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Truck Tank | Rail Tank | Tank Barge | Truck Hopper | Rail Hopper | Barge Hopper | Intermediate Bulk Container | Intermodal Tank Container |
| Food Grade Products (A) | 20 | 58 | 924 | 6 | 165 | 13 | NC | 2 |
| Petroleum and Coal Products (B) | 2 | 128 | 1050 | 1 | (a) | 166 | <1 | <1 |
| Latex, Rubber, and Resin (C) | 3 | 29 | (a) | <1 | (a) | NC | 2 | 2 |
| Soaps and Detergent (D) | 2 | 51 | NC | <1 | (a) | NC | 1 | <1 |
| Biodegradable Organic Chemicals (E) | 2 | 27 | 868 | <1 | 7 | NC | 0 | <1 |
| Refractory Organic Chemicals (F) | <1 | 22 | 683 | <1 | NC | NC | NC | 0 |
| Inorganic Chemicals (G) | 1 | 19 | 562 | <1 | 337 | NC | <1 | 0 |
| Agricultural Chemicals and Fertilizers (H) | <1 | 49 | 364 | <1 | 15 | 112 | NC | 0 |
| Chemical Products (I) | <1 | 35 | 616 | NC | (a) | NC | 0 | <1 |
| Hazardous Waste (J) | <1 | (a) | NC | NC | NC | NC | NC | NC |
| Nonhazardous Waste (K) | 9 | 23 | (a) | NC | NC | NC | NC | 0 |
| Dry Bulk Cargos (L) | <1 | 6 | NC | 2 | 90 | 446 | NC | NC |

(a) The data in this cell represents three or fewer facilities and therefore is not shown here due to confidential business information and/or other data disclosure considerations.
NC - Facilities with this characteristic were not identified by responses to the Detailed Questionnaire. Therefore, data for these facilities, if facilities with these characteristics do indeed exist, are not available for this analysis.

# Table 4-3

## Total Volume of Heel Discharged/Disposed by Cargo Group and Discharge/Disposal Method – Discharging and Zero Discharge Facilities

| Cargo Group | Heel Discharge/Disposal Method Code (gallons/year) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | WW | ID | EV | LD | LA | IN | HR | RR | DW | HD |
| Food Grade Products (A) | 591,000 | 109,000 | NC | 212,000 | NC | NC | 16,200 | 4,510,000 | NC | 7,000 |
| Petroleum and Coal Products (B) | 206,000 | 45,900 | NC | 2,100,000 | 659 | 67,000 | 1,300,000 | 5,420,000 | 3,450 | 91,500 |
| Latex, Rubber, and Resin (C) | 320,000 | 40,100 | NC | 216,000 | (a) | 66,900 | 26,200 | 36,500 | 239 | 44,100 |
| Soaps and Detergent (D) | 35,400 | 37,200 | NC | 42,200 | 2,230 | 3,660 | 13,200 | 2,020 | 3,450 | 181,000 |
| Biodegradable Organic Chemicals (E) | 193,000 | 15,600 | 15,900 | 12,100 | 2,790 | 66,100 | 15,700 | 1,470,000 | 11,700 | 247,000 |
| Refractory Organic Chemicals (F) | 2,340 | 12,500 | NC | NC | NC | 26,800 | (a) | 166,000 | NC | 67,000 |
| Inorganic Chemicals (G) | 951,000 | 168,000 | NC | 27,800 | (a) | 717 | NC | 569,000 | 31,200 | 73,800 |
| Agricultural Chemicals and Fertilizers (H) | 222,000 | NC | NC | 16,100 | 138 | 807 | NC | 150,000 | NC | 285 |
| Chemical Products (I) | 41,600 | (a) | NC | 53,400 | (a) | 29,900 | 9,360 | 542,000 | 634 | 36,100 |
| Hazardous Waste (J) | NC | NC | NC | NC | NC | 344 | NC | NC | NC | 22,200 |
| Nonhazardous Waste (K) | 15,000 | NC | NC | 2,050 | (a) | NC | NC | NC | 96 | 10,600 |
| Dry Bulk Cargos (L) | 2,160 | 64,400 | NC | 561,000 | NC | NC | NC | 1,360 | 96 | (a) |

(a) The data in this cell represents three or fewer facilities and therefore is not shown here due to confidential business information and/or other data disclosure considerations.
NC - Facilities with this characteristic were not identified by responses to the Detailed Questionnaire. Therefore, data for these facilities, if facilities with these characteristics do indeed exist, are not available for this analysis.

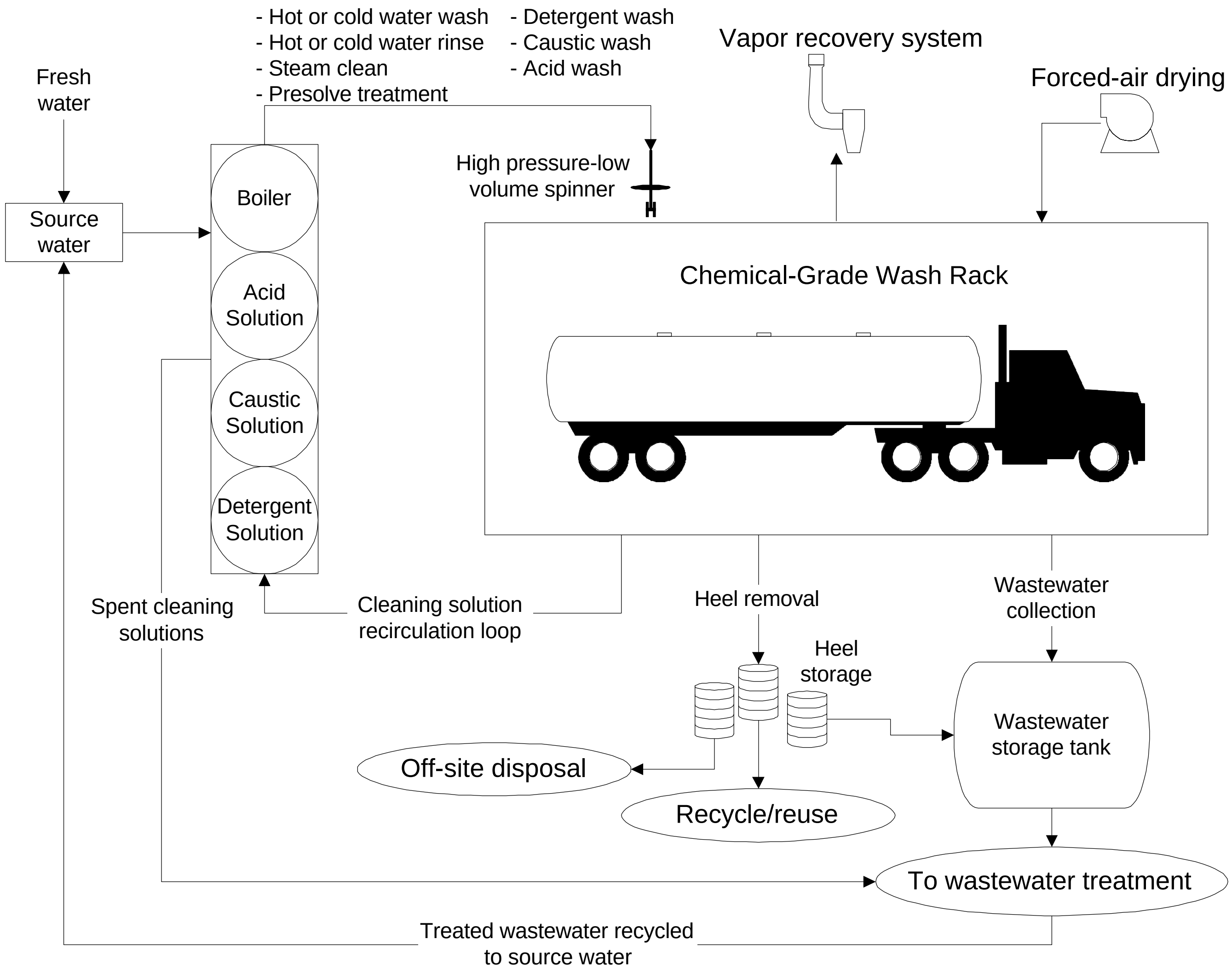


**Figure 4-1. Diagram of General TEC Operations**

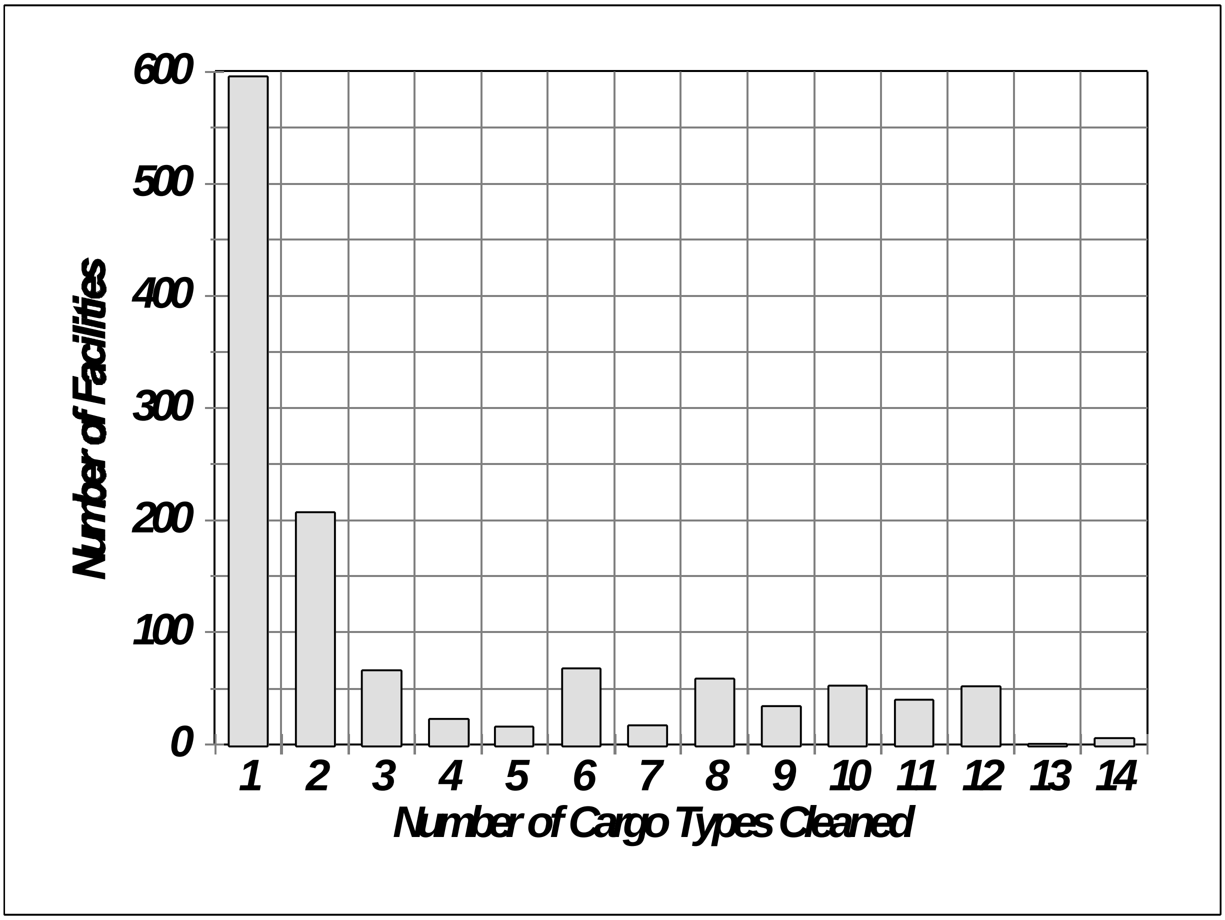


**Figure 4-2. Distribution of TEC Facilities by Number of Cargo Types Cleaned – Discharging and Zero Discharge Facilities**

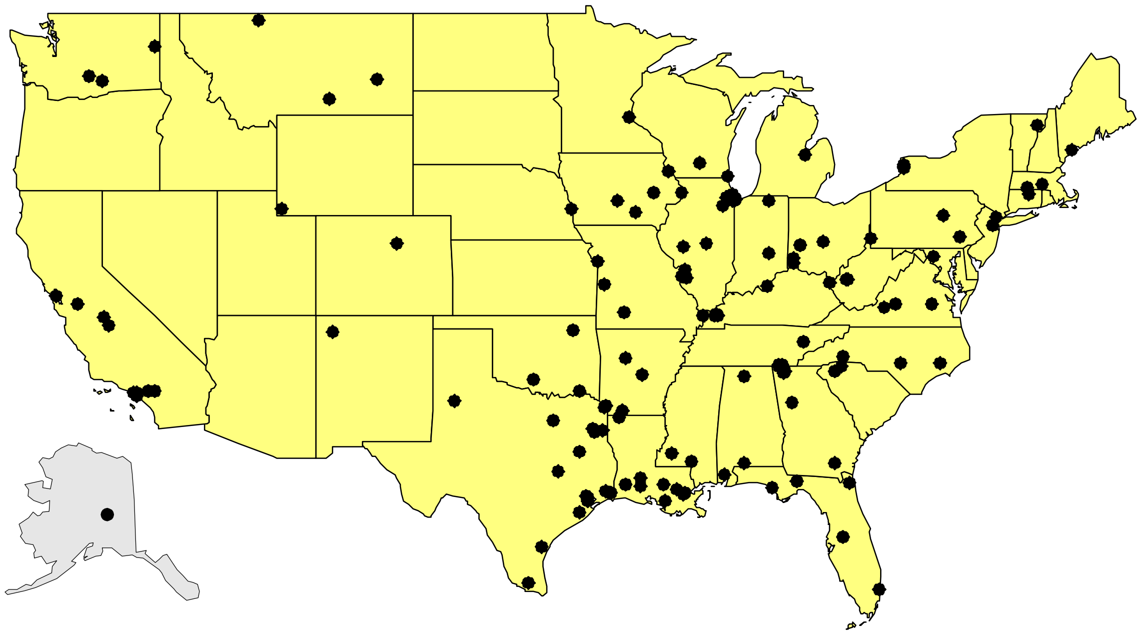

**Figure 4-3. Geographic Profile of Discharging and Zero Discharge Facilities in the TECI Detailed Questionnaire Sample Population**

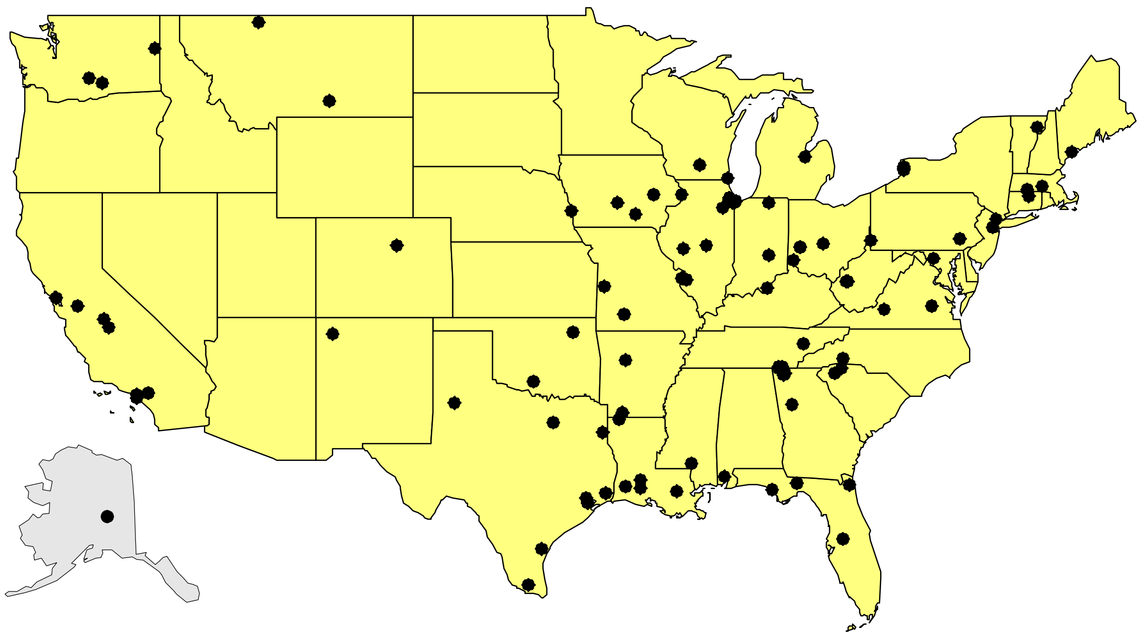

**Figure 4-4. Geographic Profile of Discharging and Zero Discharge Truck Facilities in the TECI Detailed Questionnaire Sample Population**

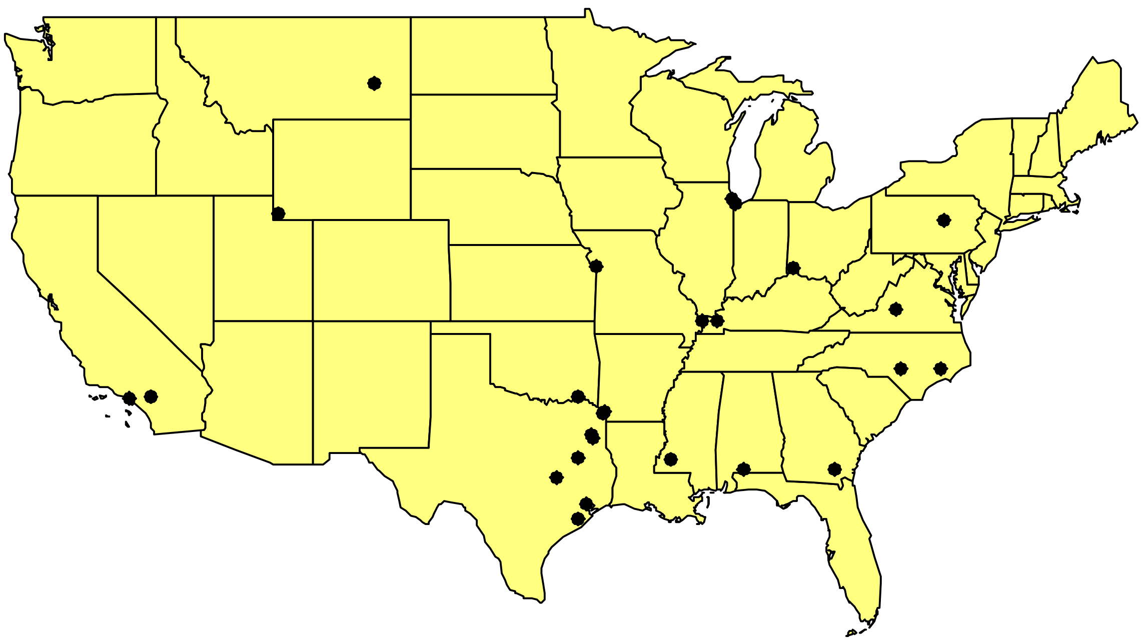

**Figure 4-5. Geographic Profile of Discharging and Zero Discharge Rail Facilities in the TECI Detailed Questionnaire Sample Population**

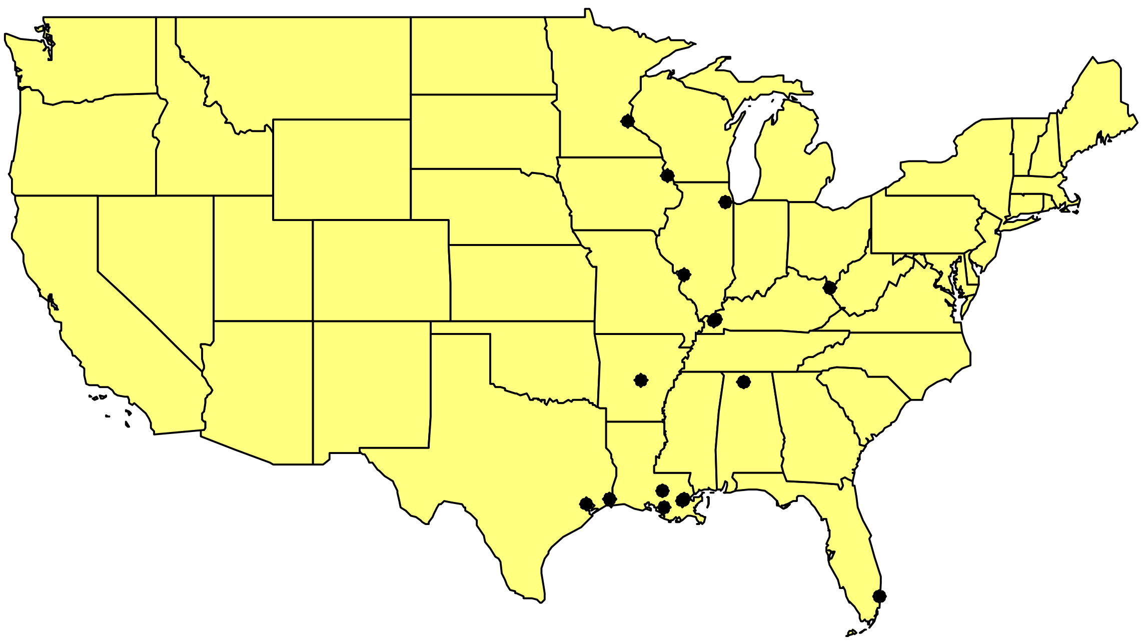

**Figure 4-6. Geographic Profile of Discharging and Zero Discharge Barge Facilities in the TECI Detailed Questionnaire Sample Population**

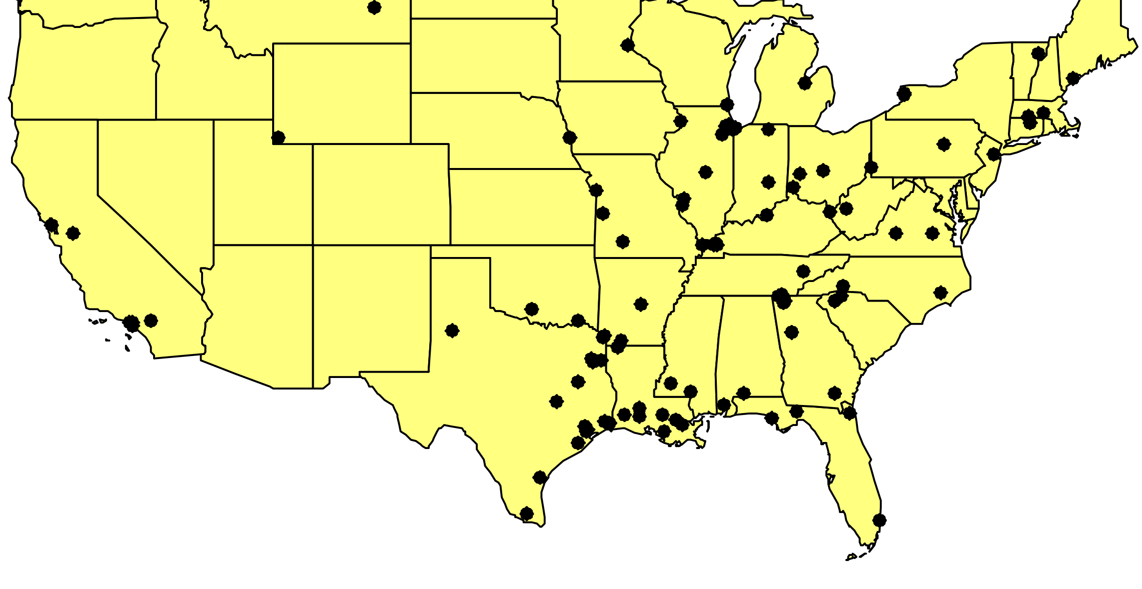

**Figure 4-7. Geographic Profile of Discharging and Zero Discharge Facilities in the TECI Detailed Questionnaire Sample Population that Clean Chemical Cargos**

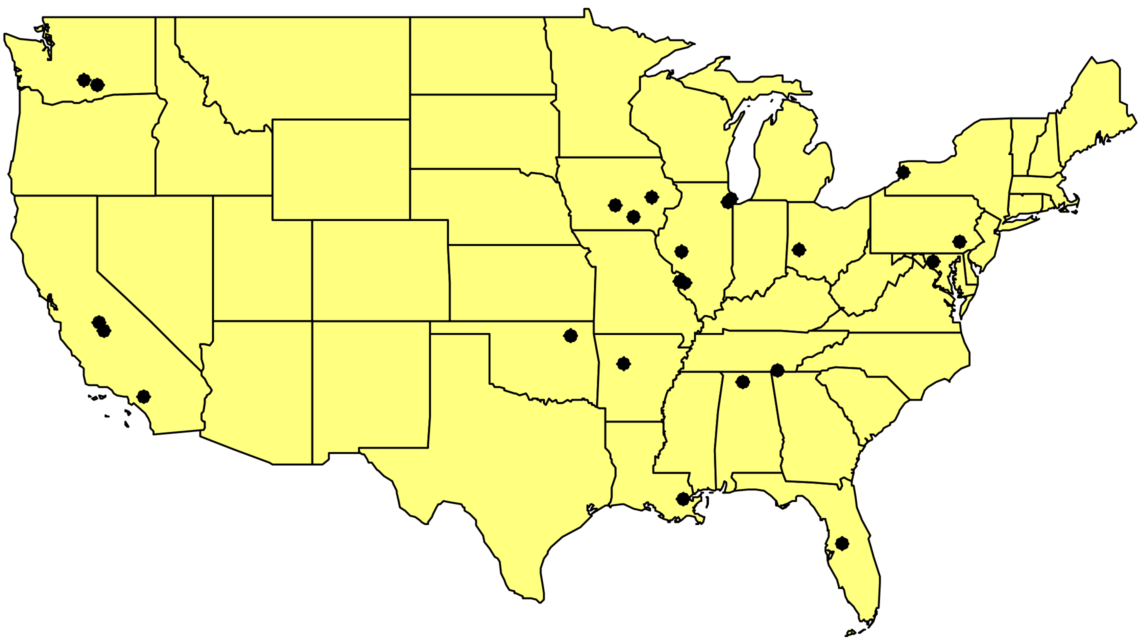

**Figure 4-8. Geographic Profile of Discharging and Zero Discharge Facilities in the TECI Detailed Questionnaire Sample Population that Clean Food Grade Cargos**

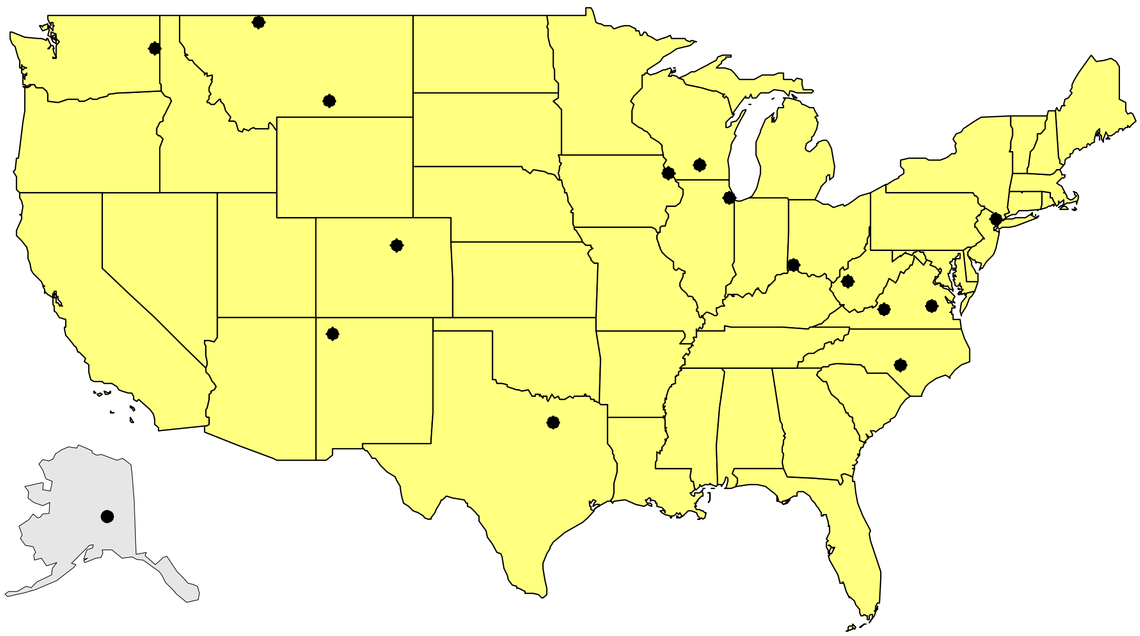

**Figure 4-9. Geographic Profile of Discharging and Zero Discharge Facilities in the TECI Detailed Questionnaire Sample Population that Clean Petroleum Cargos**